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CONTENTS OF VOLUME THE TWENTIETH.

	PAGE
Another Warning Voice from 1805. By Major-General T. B. COLLINSON, R.E.	1
Is our Merchant Service any longer a Feeder to the Royal Navy? By Captain J. C. WILSON, R.N.	61
On Circular Iron-clads. By E. J. REED, Esq., C.B., M.P.	85
How best to Improve and keep up the Seamen of the Country. By T. BRASSY, Esq., M.P., &c.	110
Proposed new Combination of Propellers for Ships of War. By GEORGE QUIOK, Engineer, R.N.	157
On the Casing of the Propeller of H.M.S. "Bruiser." By R. GRIFFITHS, Esq., C.E.	171
Cavalry. By Major FRANK S. RUSSELL, 14th Hussars.	179
Some Special Features in Large and Small Grain Powders. By Major J. P. MORGAN, R.A.	195
The Comparative Cost of the Armies of different Nations, and the Loss to a Country by Conscription. By Captain J. C. ARDAGH, R.E., F.R.G.S., &c.	218
The Naval Prize Essay (1876). On the Best Types of War Vessels for the British Navy. By Commander GERRARD H. U. NOEL, R.N.	253
Discussion on the above	275
The Tactical Power of Modern Field Artillery. By Lieutenant-Colonel C. B. BRACKENBURY, R.A., A.A.G., S.O.G.I.	310
On Magneto-Electric Light. By Captain W. DE W. ASHBY, R.E., School of Military Engineering, Chatham.	332
The Turkish Forces, and the Military Aspects of the Eastern Question. By C. E. HOWARD VINCENT, F.R.G.S., Lieutenant-Colonel, Central London Rifle Rangers, &c., &c.	346
The Italian Army. By Colonel the Lord WAVENNY, F.R.S., A.D.C. to the Queen, &c., &c., &c.	359
Recent Reforms in the Russian Army. By Captain F. C. H. CLARKE, R.A., D.A.Q.M.-General	373
Hugo Helvig's Tactical Examples	389
The New French Rifle. By Captain R. A. E. LIVERAY, R.E.	400
Notes on Naval Matters	413
The Royal Navy of England and the State Navy of France	419
Notice. "Instructions for the Cavalry Regiments about to take part in the Exercises of the Combined Cavalry Division detailed from Regiments." By Major-General VON SCHMIDT, translated by Major-General WALKER, C.B.	422
Maritime Rights. By JOHN ROSS-OF-BLADENSBURG, Coldstream Guards.	423
The Maritime Defence of England, including Offensive and Defensive Warfare. Part I.—The Organization of our Maritime Forces	447
Part II.—Our Ships of War, their Armament, &c., &c. By Captain R. A. E. SCOTT, R.N., &c., &c.	467
The Mercantile Marine considered as an Auxiliary to the Royal Navy. By T. BRASSY, Esq., M.P., &c., &c.	493
The Study of Military History by the Regimental Officers of the Army. By Major LONSDALE A. HALE, R.E., Instructor in Military History, Royal Engineer Establishment, Chatham.	508
Military Training a Means of Administrative Power and of Political Usefulness. By Major-General Sir FREDERIC J. GOLDSMID, C.B., K.C.S.I.	524
The Austrian Army in 1875. By Colonel Sir LUMLEY GRAHAM, Bart., &c., &c.	543

	PAGE
The Medical Department of the German Army in Peace and War. By Surgeon-General T. W. FOX, R.E.	560
The Military Resources of Holland. By C. E. HOWARD VINCENT, F.R.G.S., Lieutenant-Colonel, Central London Rifle Rangers, Barrister-at-Law, late 23rd Fusiliers	575
The New French Infantry Tactics. By Major LONSDALE HALE, R.E., &c., &c.	578
Notes on Field Guns. By Lieutenant W. H. JAMES, F.G.S., R.E.	584
Fortifications on the Russian-German Frontier	589
Notice. "Jahresberichte über die Veränderungen und Fortschritte im Militairwesen."	590
Ancient Naval Tactics. By the Rev. EDMOND WARRE, M.A., Eton College..	593
The Convention of Geneva, and National Societies for Aid to Sick and Wounded Soldiers in War. By JOHN FURLEY, Esq.	632
Assistance to the Wounded in time of War. By Surgeon SANDFORD MOORE, M.B., F.S.S., Instructor, Army Hospital Corps	658
On the Best Method of Propelling Steam Ships, so as to give the Greatest Facility for Manœuvring in Action, and for Avoiding Collisions at Sea. By R. GRIFFITHS, Esq., C.E.	684
A Sketch of the Russo-Turkish Campaigns of 1828-29, in Europe and Asia. By Lieutenant-General Sir RICHARD WILBRAHAM, K.C.B., &c., &c.	692
An Account of the Chinese Naval Arsenal at Foo-chow: Translated and abridged from M. Giquel's pamphlet. By Commander CYPRIAN G. A. BRIDGE, R.N.	711
Prussian Drill, 1876. By Colonel E. NEWDIGATE, Commanding Rifle Depôt.	719
The German Railway Regiment. By Lieutenant H. E. RAWSON, R.E.	738
Notices. Historical Records of the First Regiment of Militia, or Third West York Light Infantry. By Captain G. A. RAIKES, Third West York Light Infantry Militia, &c.	761
"Leitfaden für den Unterricht in der Dienstkenntniss auf den Königlichen Kriegeschulen." By Captains SCHNACKENBURG and BARTELS.	761
Sur la Dispersion Naturelle des Projectiles et la Loi des Erreurs. Par ALOYS VAN MEYDEN, Capt. Artillerie, Lausanne.	762
Campaign of 1870-1. The Operations of the Corps of General v. Werder. Compiled from the Official Documents by LUDWIG LÖHLEIN, late Captain 1st Baden Body Guard Grenadier Regiment	762
For names of Members who joined the Institution between the 1st January and the 3rd April, see pages 61, 157, 195, 332, and between 2nd May and 19th June, pages 658 and 684.	
Proceedings of the Forty-sixth Anniversary Meeting.	i
Statement of Changes amongst the Members	vii
Tabular Analysis.	viii
Award of Referees (Military Prize Essay) and the Presentation of the Gold Medal	xii
Memorial to the Right Honourable the Earl of Beaconsfield, First Lord of Her Majesty's Treasury. With Appendix.	xvii
Names of Members who joined the Institution between the 4th April and the 2nd May, and between the 19th June and the 31st December, 1876.	xxv, xxvi
Additions to the Library :—	
Books presented	xxvii
Books purchased.	xxxi
Maps, plans, charts, &c.	xxxvii
Additions to the Museum	xxxix

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 Stoney, F. S., Capt. R.A., Asst. Superintendent Royal Gun Factories, Woolwich
 Doorly, M., Maj., late 1st W. I. Regt.
 Strange, T. Bland, Lt.-Col. R.A., Special Duty, Canada
 Heathorn, T. B., Capt., late R.A.
 Macaulay, G. W., Lt.-Col., late Comd. 1st Scinde Horse
 MacGregor, H. G., Capt. 29th Regiment
- Garrison Instr., Home District
 Robinson, C. W., Major Rifle Brig., Major of Brigade, Aldershot
 Fawcett, B. H., Captain 33rd Foot, Garrison Instructor, Curragh
 Hale, L. A., Major R.E., S.M.E., Chatham
 Roe, Eugene M., Captain R. W. Fusiliers, Garrison Instructor, Shorncliffe
 Savile, A. R., Capt. 18th Bt. Irish, Garrison Instructor, Dover.
 Walton, C. E., Dep. Com.
 Morton, G. de C., Capt., A.D.C. to the Lt.-Gov., Punjab
 Horier, J. W., Capt. Scots Greys, D.A.Q.M.G., Intelligence Dept.
 Rogers, E., Capt. Staff Officer of Pensioners, Ch. ster, F.R.G.S.
 Wright, A. F. Bingham, Captain, A.D.C. to Brig. Gen. Comdg., Chatham
 Willoughby-Osborne, Eric, Lt. h.-p.
 Robertson-Ross, P., C.B., Col. 9th Brig. Depot
 Thompson, R. T., Capt. 56th Regt. D.A.A.G., Aldershot
 Marsden, W., Capt. 82nd Regt., D.A.A.G., Portsmouth
 Goldsworthy, W. T., Lt.-Col. A.A.G., Cork
 Travers, E. A., Sub-Lieut. Unattached R.M.C., Sandhurst.
 Bulger, G. E., Lieut.-Col. late 10th Regt.
 Hardtman, Berkeley J. H., Lieut., A.D.C. to the Governor, Queensland

HER MAJESTY'S INDIAN FORCES.

- Birch, W. B., Capt. Bengal Staff Corps
 Fosbery, G. V., S.G., Lt.-Col. Bengal Staff Corps
 Sandeman, J. E., Capt. Bengal Staff Corps
 Gordon, J. J. H., Lt.-Col. Commandant 29th Bengal Native Infantry
 Monas, F. J., Deputy-Inspector-Gen. Ben. Army, F.R.C.S.
 Lloyd, E., Lieutenant 4th Punjab Cavalry
 MacGregor, C. M., Lt.-Col. C.S.I., Asst. Quarter-Master-General, Army Head Quarters
 Neave, E. S., Capt. 18th Beng. Cav.
 Grant, J. M., Lt.-Col. Madras Staff Corps
- Bythell, B., Major, Fort Adjutant, Asseerghur
 Ostrehan, E. S., Major Bom. Staff Corps
 Watta, J. G., Major Bombay Staff Corps
 Cologan, J. Fitzgerald, Captain Bengal R.C.
 Sewell, H. Fane H., Capt. Hyderabad Contingent
 Clutcherbuck, T. St. Q., Capt. 29th Punjab Inf.
 Prendergast, G. A., Major Comdt. 15th Bengal Cavalry
 Heyland, A. Rowley, Capt. 1st Bombay Lancers
 Collen, E. H., Capt. Bengal S.C., Officiating Assistant Sec. to the Govnt. of India, Military Dept.

MILITIA.

ENGLAND.

- Brereton, Robert, Capt. and Adj. Royal Brecon
 White, C. H., Capt. and Adj. 1st Roy. Cheshire
 Hall, G., Lieut.-Col. Durham (Artillery)
 Tompion, H. Stewart, Capt. and Adj. 2nd. Stafford
 Digwood, W. H., Lt.-Col., late Hampshire
 Campbell, J. R., Major Hampshire (Artillery)
 Berthon, Alderson, Capt. late of Wight (Art. Mil.)
 Doughty, Chester, Capt. and Adj. Hereford
 Bailey, Vincent, Capt. Hereford
 Perrott, Herbert C., Capt. East Kent
 Wilson, C. T., Capt. 7th Royal Lancashire
 German, J., Major late 3rd Roy. Lancashire
 Enfield, Viscount, Honorary Col. 2nd Roy. Rifles
 Baylis, T. Erskine, Capt. Royal Elthorne L. I.
 Sewell, T. D., Capt. Royal London
 Swan, J. P., Capt. Roy. Westminster, Middlesex
 Parker, C. W., Capt. and Adjutant 4th Roy. South Middlesex
 Northumberland, His Grace the Duke of, Lieut.-Col. Northumberland
 Adair, A. W., Lieut.-Col. Comdnt. 2nd Somerset
 Macfiver, D., late Capt. 2nd Somerset
 Foster, Kingsley O., Capt. The (King's Own) 1st Stafford
 Evelyn, G. P., Lt.-Col. Commandant 1st Roy. Sur.
 Davis, John, Capt. 2nd Royal Surrey
 Arison, Jas. J., Col. N. Durham

- Flower, I., Capt. 3rd Roy. Surrey, I. Musketry
 Gage, The Hon. H. E. H., Lieut.-Col. Royal Sussex
 Lee, J. W., Captain Queen's Own Light Infantry
 Norris, G. G., Capt. 2nd Warwick
 Cockle, G. M.A., Cpt. Bt. Westminster, I. Musketry
 Fyers, H. T., Lieut.-Col. East and North York (Art.)
 Wade, H. C., C.B., Col. North York Rifles
 Raikes, G. A., Capt. 3rd West York
 Cadman, W. E., Major 5th West York
 Garnham, R. E. W., Major 8th West York.

SCOTLAND.

- Inverurie, Lord, Capt. Royal Aberdeenshire Highlanders.
 Walker, G. G., Lt.-Col. Scottish Borderers
 Hardie, H. R., Capt. Haddington (Artillery)
 Halkett, J. C. C., Lt.-Col., Stirling
 Mackenzie, Colin, Capt. The Highland Rifle Militia

IRELAND.

- Stawell, W. St. Leger Alcock, Lieut.-Col. North Cork (Rifles)
 Duncan, P., Major West Cork (Artillery)
 Forbes, Hon. W. F., Lt.-Col. Leitrim Rifles
 Gort, Viscount, Hon. Col. Limerick (Artillery)
 Fox, L. Loftus B., Capt. Prince of Wales' Royal Longford Rifles
 Caulfield, J. A., Lt.-Col. Royal Tyrone Fus.
 Cuffe, O. W., Capt. and Adj. Waterford (Artill e

YEOMANRY CAVALRY.

Croft, R. B., Capt. Herts, F.L.S., F.R.M.S.
Tottenham, C. J., Hon. Col. Denbighshire
Mildmay, Sir H. B. P. St. John, Bart., Lieut.-Col.
Hampshire

Hamilton, J. G. C., Major Lancashire Q.O.
Portman, Hon. W. H. B., Col. West Somerset
Stanhope, W. T. S., Capt. 1st West York

HON. ARTILLERY COMPANY.

Field, J. W. P., Capt. I. Musketry

VOLUNTEER CORPS.

Artillery.

Rutley, J. Lewis, Captain 2nd Middlesex
Innes, Alex., Major Aberdeen and Kincardine
Moore, Geo., Lieut. 3rd Essex
Pooley, H., Captain Cheshire
Haworth-Booth, B. B., Lieut.-Col. East Yorkshire

Engineers

Kain, G. J., Capt. Middlesex
Balley, W., Capt. and Adjutant 2nd Tower Hamlets

Rifles.

Acland, Sir Thomas Dyke, Bart., M.P., Lieut.-Col.
Devon
Davieson, D., Lieut.-Col. Edinburgh City
Twyford, H. R., Lieut.-Col. Hampshire
Hardinge, Viscount, Lieut.-Col. Kent
Sweny, Eugene, Capt. Kent
Higgins, F., Major, 6th Lancashire
Hutchinson, J., Hon. Col. 8th Lancashire

Toukine, A. S., Capt. 1st Middlesex Victoria
Vickers, C.B., Lt.-Col. 2nd London
Page, Sam. Flood, Major late London Scottish
Lombard, G. C. S., Capt. and Adj. 21st Middlesex
Baker, James, Major 22nd (Queen's) Westminster
Boupeil, C. M., Capt. 23rd Inns of Court
Enfield, Viscount, Honorary Col. 29th North. Midlax.
Baylis, T. Henry, Major 36th Middlesex, Q.C.
Vincent, C. E. Howard, Lieut.-Col. 40th Middlesex
Skirne, Harcourt, Capt. 43rd Middlesex
Walker, A., Capt. and Adj. Northumberland
Wright, C. J., Lieut.-Col. Nottingham
Thomas, W. H., Capt. 1st Surrey
Dartmouth, Earl of, Capt. Stafford
Rouse, Rolla, Major late 2nd Suffolk
Harding Charles, Major 19th Surrey, F.R.G.S.
Ratcliff, C., Lieut.-Col. 1st Warwickshire
Longstaff, Llewellyn W., Lieut.-Col. 1st East York,
F.R.G.S.

COLONIAL RESERVE FORCES.

Militia.

Gore, Augustus F., Lt.-Col., Barbadoes
Brunel, A., Lt.-Col., Active Militia, Canada
Turnbull, J. F., Colonel Canadian Hussars.
Imlack, B. W., Lt.-Col., British Guiana
Gautier, F. E., Capt., A.D.C. to H.E. the Governor of Quebec.

The Journal

OF THE

Royal United Service Institution.

VOL. XX.

1877.

APPENDIX.

PROCEEDINGS OF THE FORTY-SIXTH ANNIVERSARY MEETING.

THE FORTY-SIXTH ANNIVERSARY MEETING of the Members was held in the Theatre of the Institution, on Saturday, March 3rd, 1877.

The Right Hon. GATHORNE HARDY, M.P., Secretary of State for War, in the Chair.

I. The SECRETARY read the notice convening the Meeting.

II. The Secretary read the Minutes of the Forty-fifth Anniversary Meeting.

III. The Forty-sixth Annual Report was read as follows:—

1. The Council have the pleasure of laying before the Members their Forty-Sixth Annual Report.

MEMBERS.

2. Thirty-eight Life Members and one hundred and twenty-four Annual Subscribers, making a total of one hundred and sixty-two new Members, joined the Institution during the past year. The loss by death amounted to seventy-two, and forty-two Members withdrew their names, whilst the names of thirty-six have been struck off the list in consequence of the non-payment of their subscriptions for many years, after frequent applications. The increase therefore is twelve.

A detailed statement of the changes in the List of Members, and a tabular analysis of the present and past state of the Institution, will be found on pages 7 and 8.

FINANCE.

3. The usual Abstract of the Yearly Accounts, as audited on the 7th February, will be found on the following page.

ESTIMATE OF RECEIPTS AND EXPENDITURE FOR THE YEAR 1877.

EXPENDITURE.			RECEIPTS.		
	£	s. d.		£	s. d.
Secretary's Salary and Lodging allowance	400	- -	Balance at Bankers, 31st Dec., 1876	105	- -
Librarian and Accountant's do. ..	220	- -	Annual Subscriptions :		
Clerk's do.	104	- -	£	s.	d.
Servants' Wages	520	- -	At 10s. ..	260	- -
Ditto Clothing	75	- -	Above ..	2,510	- -
Insurance	18	- -		2,770	- -
Ground Rent	205	- -	Entrance Fees	170	- -
Fuel	70	- -	Dividends	370	- -
Lighting	70	- -	Interest on Exchequer Bills	20	- -
Assessed and Income Taxes ..	65	- -	Government Grant	600	- -
Parish and Water Rates ..	100	- -	Sale of Journals	100	- -
Artificers, Repairs, &c. ..	100	- -	Miscellaneous Receipts ..	40	- -
Museum	50	- -			
Gold Medal	12	- -			
Library and Topographical Departments	250	- -			
Advertisements	100	- -			
Printing Circulars, & Stationery	200	- -			
Lectures	65	- -			
Journals, including Printing Annual Report and List of Members ..	1,200	- -			
Postage of Journals	200	- -			
Postage	30	- -			
House Expenses and Sundries	60	- -			
Balance	61	- -			
Total.. ..	£4,175	- -	Total.. ..	£4,175	- -

LIFE SUBSCRIPTIONS.

4. Life Subscriptions to the amount of £583 14s., including £127 not invested in 1875, have been invested in Three per Cent. Consols.

CAPITAL ACCOUNT.

5. The funded property of the Institution on the 1st January, 1877, was £11,304 15s. 3d., as compared with £10,721 1s. 3d., on the 1st January, 1876.

THE FUTURE LOCALITY OF THE INSTITUTION.

6. A Memorial, signed by His Royal Highness the President, has been presented to the Right Hon. The Earl of Beaconsfield, First Lord of H.M.'s Treasury (for Memorial see page xvii), praying that when the appropriation of the Crown lands in the neighbourhood of the Institution

takes place, its claim for a permanent site, may receive due consideration; and a deputation from the Council waited on Mr. W. H. Smith, M.P., one of the Secretaries of the Treasury, with a similar object. He assured the deputation that the value of the Institution is fully recognised by the Government, and that when the proper time arrives, the claims of the Institution will be duly considered.

LECTURES AND JOURNAL.

7. The Council desire to record their best thanks to those Gentlemen who, during the past year, contributed much valuable information on professional subjects. Eighteen Lectures were delivered, and fifteen Papers were read in the Theatre of the Institution.

A portion of the Journal is now reserved for the publication of articles, original or compiled, on Foreign professional subjects, also for notices of professional works, either Foreign or English. This arrangement promises to be very successful in affording much valuable information to the Members. The superintendence of this part of the Journal has been kindly undertaken by Major Lonsdale Hale, R.E.

The Council earnestly invite the co-operation of the Members in supplying Lectures or other subject-matter for the Journal, and in otherwise maintaining the high character which it bears both at home and abroad.

LIBRARY.

8. Six hundred and ninety-eight volumes were added to the Library during the past year; of these, 140 were purchased and 458 presented. Among the latter, the following are the most noteworthy:—

By the AUSTRIAN Government—

Mittheilungen über Gegenstände des Artillerie- und Genie-Wesens.

Mittheilungen aus dem Gebiete des See-wesens.

Organ des Wiener Militär-wissenschaftlichen Vereins.

Official Account of the Italian War of 1859, 3 vols.

By the FRENCH Government—

Revue Maritime et Coloniale.

„ *Militaire de l'Étranger.*

By the GERMAN Government—

Archiv für die Artillerie- und Ingenieur-Offiziere des Deutschen Reichsheeres.

Jahrbücher für die Deutsche Armee und Marine.

Militärische Blätter.

Militär-Literatur-Zeitung.

Neue Militärische Blätter.

By the NETHERLANDS Government—

Four Plates of "Matériel de l'Artillerie."

By the RUSSIAN Government—

Engineering Journal.

Naval Review.

By the SPANISH Government—

Memorial de Ingenieros.

By the SWEDISH Government—

Krigs-Vetens-Kaps Akademiens Handlingar.

By the UNITED STATES Government—

Fifteen Volumes, on various Naval and Military subjects.

The exchange of Journals with Foreign Governments, and with various Scientific Societies, in this and other Countries, has been continued.

The Library now contains upwards of 17,700 volumes.

Of the volumes presented, about one hundred were given, shortly before his decease, by the late J. W. Fleming, Esq., F.R.C.S., Surgeon-Major, formerly of the 37th Regiment and 4th Royal Irish Dragoon Guards. The Council have thanked on several previous occasions that Officer for gifts of rare works and medals.

The late Capt. Arthur C. Tupper was a frequent contributor to the Library, and bequeathed to the Institution a collection of Memoranda on Naval, Military, Antiquarian, and general subjects, carefully indexed. The Council deeply regret the loss the Institution has sustained by his death. He was a zealous Member of the Council for nearly twenty years, and gave valuable assistance in organizing and maintaining the Museum.

TOPOGRAPHICAL DEPARTMENT.

9. The Secretary of State for War has presented Photographs and Lithographs of Guns, Casemates, Shields, Targets, &c., and copies of works published by the War Office.

The Institution has also received from the Lords Commissioners of the Admiralty, Charts, Sailing-Directions, and other valuable works.

MUSEUM.

10. The additions to the Museum and to the Library will be found in the Proceedings of this day's Meeting, and in the Appendix to Vol. XX of the Journal.

Want of space has prevented many other additions being made to the Collection of Models in the Museum.

The several Foreign Governments, the Secretaries of State for War and India, the Lords Commissioners of the Admiralty, and the various Donors, have been thanked by the Council for their respective presents to the Library and Museum.

VICE-PATRONS.

11. The Council regret to record the death of one of the Vice-Patrons of the Institution, Field-Marshal the Marquis of Tweeddale,

K.T., G.C.B. The Marquis of Tweeddale became a Member in 1840, and was elected a Vice-Patron in 1875, on his promotion to the rank of Field-Marshal.

The Council have had the pleasure of electing Admiral of the Fleet Sir Provo W. Parry Wallis, G.C.B., a Vice-Patron of the Institution.

HONORARY MEMBERS.

12. The Council have had great pleasure in electing Lady Sarah Lindsay an Honorary Member, in recognition of the long and valuable services rendered to the Institution by the late Lieut.-Gen. the Hon. Sir James Lindsay, K.C.M.G., and in acknowledgment of a present made by her of historical interest, viz., two chairs formerly used by the Emperor Napoleon the 1st at Malmaison.

Several Foreign Officers have been admitted as Honorary Members during their stay in this country.

CORRESPONDING MEMBERS OF COUNCIL.

13. On the 1st January, 1877, there were 336 Corresponding Members of Council; the Council thank them for their past services, and trust that they will continue their efforts to make the advantages of the Institution more widely known.

GOLD MEDAL.

14. At the last Anniversary Meeting, the Gold Medal of the Institution was awarded to Commander Gerard H. Noel, R.N., for his Essay on "The Best Types of War-Vessels for the British Navy."

The subject for the year 1876 was announced as follows, viz.: "On the Causes which have led to the Pre-eminence of Nations in War." Seventeen Essays have been sent in; the award by the Officers who kindly undertook the duties of referees, viz., General J. R. Craufurd, General Charles Stuart, and Major-General Collinson, R.E., will now be made known to the Meeting.

The subject for the Essay for the current year is as follows, viz.:—

"Great Britain's Maritime Power; how best developed as regards—

1. Fighting Ships.
2. Protection of Commerce.
3. Naval Volunteer or Supplemental Force.
4. Colonial and Home Defence;—

the Classes, Armament, and description of the Vessels needed; and the organisation required to secure a Powerful and Economic Imperial Naval Force."

CONCLUSION.

In conclusion, the Council congratulate the Members on the satisfactory state of the Finances, and on the general efficiency of the Institution.

STATEMENT OF CHANGES AMONG THE MEMBERS SINCE
1ST JANUARY, 1876.

	Life.	Annual.	Total.
Number of Members, 31st December, 1875 ..	1,102	3,206	4,308
„ „ joined during 1876 ..	38	124	162
	1,140	3,330	4,470
Changed from Annual to Life	+ 12	- 12	
	1,152	3,318	4,470
	Life.	Annual.	
Deduct —Deaths during 1876 ..	16	56	
Withdrawals. . .	—	42	
Struck off . . .	—	36	
	16	134	150
Number of Members on 1st January, 1877	1,136	3,184	4,320

TABULAR ANALYSIS OF THE STATE OF THE INSTITUTION

To 31st of December, 1876.

Year. 1st Jan. to 31st Dec.	Annual Subs. received.	En- trance Fees.	Income (from all sources).	Life Subs. received.	Amount of Stock.	Invested in the purchase of Books, &c.	No. of Vols. in Library.	No. of Mem- bers on the 31st Dec.	Number of Visitors
£	£	£	£	£	£	£			
1831	654	..	654	1,194	..	..	..	1,437	..
1832	1,146	..	1,146	978	..	..	..	2,699	..
1833	1,405	..	1,450	692	..	..	..	3,341	..
1834	1,500	..	1,549	583	1,100	..	..	3,748	13,376
1835	1,480	..	1,574	366	2,430	40	..	4,155	8,537
1836	1,570	..	1,682	330	3,747	45	..	4,069	8,521
1837	1,549	..	1,747	222	4,747	180	..	4,164	10,907
1838	1,462	..	1,634	230	5,500	246	..	4,175	15,788
1839	1,399	..	1,565	168	5,500	292	..	4,186	16,248
1840	1,363	..	1,525	198	5,500	446	5,500	4,257	17,120
1841	1,450	..	1,643	186	6,000	243	5,850	4,243	19,421
1842	1,378	..	1,565	144	6,400	373	6,450	4,127	21,552
1843	1,299	..	1,494	140	6,700	237	7,000	4,078	27,056
1844	1,274	..	1,408	112	3,000	298	7,850	3,968	22,767
1845	1,313	..	1,466	228	1,500	127	8,100	3,988	21,627
1846	1,298	..	1,456	138	1,500	74	8,410	4,031	32,885
1847	1,314	74	1,502	132	1,700	37	..	4,017	38,699
1848	1,175	57	1,375	48	1,700	85	9,641	3,947	37,140
1849	1,176	72	1,375	84	1,150	58	..	3,970	33,333
1850	1,141	106	1,294	198	600	36	..	3,998	33,773
1851	1,136	131	1,292	66	666	34	10,150	3,188	52,173
1852	1,134	133	1,281	114	200	43	10,300	3,078	20,609
1853	1,243	319	1,684	264	528	41	10,420	3,251	25,952
1854	1,200	138	1,368	126	612	95	10,587	3,171	22,661
1855	1,159	107	1,289	120	653	55	10,780	3,131	14,778
1856	1,216	197	1,519	156	761	47	10,832	3,204	16,184
1857	1,258	176	1,937	78	1,038	40	10,960	3,168	12,755
1858	1,318	221	2,102	105	488	31	11,062	3,246	25,747
1859	1,526	195	2,277	512	946	70	11,320	3,344	28,739
1860	1,961	298	3,577	397	2,178	114	11,517	3,518	28,011
1861	2,122	305	2,899	266	2,846	99	11,812	3,689	23,296
1862	2,296	242	3,127	239	3,178	109	12,026	3,797	27,215
1863	2,379	218	3,100	405	3,583	143	12,296	3,847	18,150
1864	2,425	215	3,253	222	4,516	116	12,700	3,902	17,276
1865	2,435	154	3,467	235	4,804	137	13,000	3,895	18,253
1866	2,435	157	3,488	299	5,486	150	13,337	3,891	17,067
1867	2,431	141	3,467	208	5,732	140	13,800	3,823	17,211
1868	2,446	184	3,534	297	6,396	119	14,100	3,812	16,417
1869	2,368	165	3,485	238	6,653	232	14,660	3,792	15,947
1870	2,376	178	3,493	333	7,313	140	15,055	3,831	18,654
1871	2,455	237	3,677	533	7,748	202	15,501	3,922	19,420
1872	2,620	336	4,111	713	8,927	192	15,761	4,116	19,773
1873	2,776	295	4,316	535	9,465	222	16,227	4,276	18,183
1874	2,819	216	4,491	409	10,189	218	16,624	4,330	16,771
1875	2,801	154	4,695	469	10,721	228	17,000	4,308	15,960
1876	2,794	162	4,500	437	11,805	171	17,700	4,320	15,548

IV. Lord ELCHO, M.P. :—

Mr. Hardy and Gentlemen,—When I came down here punctually at twelve o'clock, I had not the remotest conception that I was to be asked to move the adoption of a Report which I at that time had not read ; but representing a branch of the Reserve Forces, and being therefore amenable to military discipline, and many persons supposing that the Volunteers are not a really disciplined force, and do not readily yield to discipline,—which I need not say is a great libel on that force,—I thought if I declined on this occasion to move a Report, of which I knew nothing, I should fall under that censure justly, and therefore I submit, and here I am, pressed into this service, finding applied to the Reserve part of the Forces that system which used to be practised in the great war with reference to manning the Navy. I am suffering from being pressed into the Service, though I must say I am a very willing pressed man. You have heard the Report read, and if I were to speak here for a week, I do not think I could say more than that the Report appears to me thoroughly satisfactory. One of our best soldiers is, I find, to second this motion, I mean the distinguished officer Sir Lintorn Simmons, and anything, therefore, that is necessary to be said upon the military or other bearings of the Report, will no doubt be most thoroughly said by him, but as a semi-civilian Member of this Institution, and a Member of Parliament, one part of the Report I look upon with great satisfaction, that part which refers to the locality, the building, and the probable future of this Institution. It will be in the recollection of Members of the Institution that at one time this, what I may call very valuable Institution, was put in considerable peril of being swept away from here, and we wondered where we should pitch our tent. There was considerable feeling with regard to the matter at one meeting, when I think the Duke of Cambridge was in the chair. Remonstrances were made, and the late Government were ready to admit the importance of this Institution. Well, this question appears by the Report to be again arising, and it is gratifying to find that the succeeding Government, of which Lord Beaconsfield is the head, and of which I am happy to say we have a distinguished member here in the chair to-day, the Secretary of State for War, who must naturally take a sort of parental interest in this Institution, are also favourably disposed to give us a site, if necessary to take the ground which this building now occupies. I think we may congratulate the Institution upon that. In connection with that subject, I see there is a paragraph in the Report to this effect :—"Want of space has prevented many other additions being made to the collection of models in the Museum." Now we who know how valuable and interesting these models are, feel that it is very desirable that additions to such a Museum should not be prevented by want of space. That appears to be another reason why the Government should favourably consider any question of giving us a better building or an extension of space whereon to build. Having said this much, I will leave Sir Lintorn Simmons to say anything that may be desired on military or other matters. I will only say this, that I am sure every one must feel the value of this important National Institution ; and feeling that as we all do (or we should not be here), I may I think ask you heartily to join in the conclusion of the Report, which is, that "the Council congratulate the Members on the satisfactory state of the finances,"—for finances are the sinews of an Institution as well as of war,—and on the general efficiency of the Institution." As a Member of the Institution I may be allowed, on behalf of the Members, to do what the Council cannot do for themselves, congratulate them on the management of the affairs of the Institution in such a satisfactory manner. I will now, without further preface, move, "That the Report now read, be adopted and printed for circulation among the Members."

Lieut.-Gen. Sir LINTORN SIMMONS, K.C.B., R.E. :—

After what has fallen from his Lordship, there is very little for me to say as to the fabric of this Institution. I think we may recall the old saying, that one volunteer is worth two pressed men. I do not know in what capacity his Lordship has appeared on this occasion. He certainly appeared as a pressed man, but he

must be a very valuable volunteer if he is worth twice what he has shown himself worth on this occasion. I have very few words to say with regard to the Report, but I think there are one or two facts in it which are of great interest. First of all, with reference to the state of our Library. When I first entered the Service, nearly forty years ago, there was scarcely any literature in the English language on military subjects, and very little discussion on them, and this Institution has taken a very honourable part in promoting the study of professional subjects throughout the Army and Navy. So little were books written on professional subjects in former days, and so little circulation had they, that I may mention a case that came under my own knowledge of a scientific work written in the English language, which was translated into French and had an enormous circulation in France, while to my certain knowledge never more than 200 or 300 copies were disposed of in this country. That shows pretty much what the state of study was in former days. Happily we have come upon very different times, and now, if officers either of the Army or the Navy wish for success, they must study, and I think this Institution has done a great deal by collecting such a first-rate Library, which affords a mine from which officers may extract the ore which is afterwards worked up into valuable essays and discussions in this room, and which also supplies means of study for all officers visiting London. The Library has been greatly frequented, and we must congratulate ourselves on the possession of it. As regards the Lectures, also, I think there has been very great and valuable progress. I think it was in 1851 or 1852 when the first discussion took place in the Theatre of this Institution on a military subject, and I remember taking part in that discussion, and being sent for to the Ordnance Office and severely wiggd; and I was reminded that there was a station in the West Indies which I might have to visit for the sake of my health. I think that that state of things has passed away. The Secretary of State for War would scarcely send for an officer now-a-days and wig him if he discussed a subject of general interest. The subject of that first discussion was a purely scientific one; it was a system of fortification proposed by Mr. Ferguson. The Authorities did not wish to have it discussed, because it interfered with their own prejudices, and that was the manner in which they attempted to gag officers. I think we have arrived at a better time than that, and so long as the Council do not admit into the discussions subjects touching upon discipline, we shall be perfectly safe on the lines on which we have worked for so many years. I have, therefore, great satisfaction in seconding this resolution, because the Institution is serving a very useful purpose indeed as regards the Army. There is one other point. I see in the accounts £1,200 a year expended in issuing the Journal. This Journal has become a most valuable military handbook; it goes to all parts of the world; it is studied by officers wherever they are in distant regions; it communicates to them knowledge which formerly could only be obtained by visiting the Metropolis or Woolwich; and it keeps them *au courant* with whatever is on the *tapis* in this country with regard to military subjects. I am happy to see that there is an extension proposed, under the direction of my brother officer, Major Hale, by which the Journal will contain extracts and *précis* of foreign works. I think this will be of the greatest possible advantage to the Institution. I have, therefore, much pleasure in seconding this resolution.

The Resolution was put from the Chair, and was carried unanimously.

V. Names of the Members who retire from the Council by rotation:—

Major-Gen. Sir HENRY R. GREEN, C.B., K.C.S.I.	Vice-Admiral Sir J. WALTER TABLE- TON, K.C.B.
W. F. HIGGINS, Esq.	Rear-Admiral M. S. NOLLOTH.
Major-Gen. F. M. RARDIEY WILMOT, E.A., F.R.S.	Brigadier-Gen. the Hon. FREDERIC THESIGER, C.B., A.D.C. to the Queen.
Admiral of the Fleet — HENRY J. COD- RINGTON,	

Lieut.-Gen. Sir GEORGE BALFOUR, K.C.B., M.P. :—

Mr. Hardy, my Lords, and Gentlemen,—I have also been called upon unexpectedly to propose a resolution, but I need not say with what pleasure I perform the duty, because, considering this Institution to be of great national importance not only to the country but likewise to the Army and Navy, I am always prepared to give any assistance in my power to promote the objects which it has in view. I need not say, Mr. Hardy, that the progress which my noble friend behind me (Lord Elcho) and my friend General Simmons have shown to have taken place with regard to this Institution, has been one of continued success. We have never ceased to progress from the time this Institution was established, and we have now arrived at a highly satisfactory result. Now that progress never could have been secured, had it not been for good management on the part of those who conducted its affairs. It is to those gentlemen, therefore, that I am now called upon to propose a resolution of thanks,—to those gentlemen who for the past year have managed the affairs of this Institution, and who now retire by rotation. I am sure that is a duty which every Member will readily perform, for we cannot give too much credit to those gentlemen who devote their time and leisure to the performance of such important services. Without detaining the Meeting longer, I beg to propose, “That the thanks of this Meeting be given to the Members of the Council who retire by rotation.” I have also had the duty given to me to propose the following gentlemen to succeed them :—

Major-General Sir HENRY E. GREEN, C.B., K.C.S.I. W. F. HIGGINS, Esq. Admiral of the Fleet Sir HENRY J. CODRINGTON, K.C.B.	} For re-election.	Captain H. F. NICHOLSON, R.N. Colonel H. C. FLETCHER, C.M.G., Com. 2nd Batt. Scots Fus. Gds. Major-General D. LYSONS, C.B. Major-General Sir FREDERIC J. GOLD- SMID, C.B., K.C.S.I.
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And “that the following names be adopted from which to select, in the event of vacancies occurring in the Council,” viz. :—

Colonel the Hon. PERCY FREEDING, C.B., Commanding the Coldstream Gds.	Colonel Lord ELCHO, M.P., Comd. Lon- don Scottish Rifle Volunteers. Rear-Admiral JASPER H. SELWYN.
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I am sure that the Members of the Institution will be most willing to elect those distinguished officers whose names I have read out, because they must be quite confident that those who are now named as worthy of the management of its affairs, will perform their duty in a manner which will be valuable to the Institution. I beg, therefore, to propose that resolution.

The Resolution having been seconded by Admiral Sir CLAUDE BUCKLE, K.C.B., was put from the Chair, and was carried unanimously.

VI. Colonel Lord WAVENEY, F.R.S. :—

The third resolution appears to be merely of a formal character; still it has its special recommendation in the nature of the services for which it is given, it is, “That the thanks of this Meeting be given to the Auditors for their valuable services.” With regard to the services of Auditors, we know how largely they must enter into a well-arranged scheme of finance, and as a subsidiary matter of congratulation to the Institution, it appears to me that the accuracy with which the accounts are made out, and the minuteness of attention which has been paid to them, are most satisfactory. I, therefore, move, “That the thanks of this Meeting be given to the Auditors for their valuable services, and that the following gentlemen be elected for the ensuing year :—

T. G. RINGWAY, Esq., for re-election.	E. R. RAITT, Esq.
T. E. DRAPER, Esq.	Capt. J. E. A. DOLBY.

Rev. Mr. HALPIN, Chaplain to the Forces :—

In seconding this resolution, perhaps if I were to do it without a word in addition, it would be better, yet as I feel a deep interest in the Institution, I may be allowed to make a remark. It is to the growing value of this Institution to which I wish specially to call attention. Thirty years ago I was indirectly connected with it, my father having been a Member. Then it was only considered an out-of-the-way place, not possessing much interest or value, where a few old gentlemen, retired from the Service, came to read a limited number of newspapers. Now we see the vast difference. Its scientific interest and value are recognised throughout the length and breadth of the country, yea, over the face of the world. Now to whom is this due? No doubt to the Managers of the Institution; and when we give thanks to the Auditors, it is thanking indirectly and through them, the Managers, the Council, and the Secretaries, who have brought this Institution to such a state of advancement, and have made it so valuable in the eyes of the whole Naval and Military community, and of the community at large. I will not detain the Meeting any longer, but beg leave to have the honour of seconding the resolution.

The Resolution was then put from the Chair, and was carried unanimously.

VII. The SECRETARY read the Report of the Referees on the Military Prize Essay, on "The Causes which have led to the Pre-eminence of Nations in War," and the Chairman announced the name of the successful candidate to be John Ross, of Bladensburg, Coldstream Guards, and presented him with the Gold Medal.

The SECRETARY then read the names of the writers of the five Essays honourably mentioned, viz. :—Colonel H. C. Fletcher, Scots Fusilier Guards; Lieut.-General Sir Richard Wilbraham, K.C.B.; Captain De Thoren, h.p. 38th Regiment; Lieut. H. Elsdale, R.E.; and Captain H. W. L. Hime, R.A. (Gold Medallist R.U.S.I., 1875.)

The CHAIRMAN announced the following to be the subject for the Prize Essay for the current year, to be rendered on or before the 1st November, 1877, viz. :—

"Great Britain's Maritime Power : how best developed as regards—

1st. Fighting Ships.

2nd. Protection of Commerce.

3rd. Naval Volunteers, or Supplemental Force.

4th. Coast and Home Defence ;—

the Classes, Armament, and description of the Vessels needed; and the organization required to secure a Powerful and Economic Imperial Naval Force."

Admiral of the Fleet Sir HENRY CODRINGTON, K.C.B. :—

It is now my pleasure, as well as my duty, to propose a vote of thanks to the Referees for the trouble they have taken and the decision they have come to. I do not know that it is easy for us at once to estimate the difficulty of a judgment of this sort. Perhaps the mere fact that after adjudging the prize to one gentleman, they have had to name three or four others whose Essays are most excellent in their way, and recommend them for publication, will show the difficulty these gentlemen

have had in deciding. There are many points which go to a decision of this sort. The Referees have to consider the style of the Essays, the appropriateness of the language, the whole treatment of the subject; in short, to balance one consideration with another, is a very difficult matter indeed: and where the number of papers is great, the difficulty is very much increased by the necessity of bearing in mind the respective excellences of each paper read. In this case, there have been some most excellent papers, and the Referees have found it their duty to recommend several for publication. There is no question that we are very much indebted to those gentlemen who have taken all this trouble, and our best thanks are due to them. I have great pleasure, therefore, in proposing "A vote of thanks to General J. R. Craufurd, General Charles Stuart, and Major-General Collinson, R.E., for their valuable services in adjudicating on the Military Prize Essay, for the trouble they have taken and for the decision they have come to."

The Resolution having been seconded by Major General F. C. A. STEPHENSON, C.B., was put from the Chair, and was carried unanimously.

The CHAIRMAN having announced that the business of the Meeting was concluded,

The Chair was taken by Sir Henry Codrington.

Admiral of the Fleet Sir GEORGE SARTORIUS, K.C.B.:—

Sir,—A very agreeable task has devolved upon me, viz., that of proposing that the thanks of this Society be given to one who bears a name so well-known and so highly honoured as yours. It is also a very favourable augury for an important object we have in view, viz., the obtaining a site for our Institution, that the War Office has taken so much interest in it; and this is an opportunity I should like to take advantage of to make a few observations upon the subject of the Memorial. If we could have an independent site for our Institution, that would be the most advantageous; but if that is impossible, in my dreams I have imagined some magnificent building, upon a very large scale, which should combine all the Scientific Societies of London under the same roof, so that we might move about conveniently and watch the proceedings taking place in all these Institutions. That would be of the greatest service to us individually and nationally. Whether that dream of mine can be realised or not, depends on a much higher power than myself to say, but in returning thanks to you, Sir, for the compliment you have paid us and the interest that you take in this Society, I must say that that interest gives us great hope that we shall not fail to have either my dream accomplished or an independent site.

Major-General SHUTE, C.B., M.P.:—

I have great pleasure in seconding the resolution. The merits and wants of this Institution have been so fully dilated on by other speakers, that it is quite unnecessary for me to trouble you with any remarks upon them. Our great object of course is, that my right honourable friend, the Secretary of State for War, should take the same deep interest in this most valuable Institution as he has shown in the British Army. No doubt there are sundry difficulties to be solved in connection with this Institution, but he has had greater with regard to the Army, and I have no doubt he will overcome the former in the same able manner as he has overcome the latter. Now, my Lords and Gentlemen, I know you must feel with me how deeply indebted the Army is, and all of us are, who are Members of this Institution, to the right honourable gentleman the Secretary of State for War. It would be in extremely bad taste were I on this occasion to refer to the various difficulties which he, in coming into office, has had to solve; but there are three which I may very shortly allude to, because every one here present, as I know from the Lectures I have attended, takes the deepest interest in them. The first difficulty was to know how we could

possibly have a moderately strong and fairly good Army, with a Reserve; how in order to get greater numbers, we could add to the attractions of the Army. Now, my Lords and Gentlemen, our Secretary of State for War has solved that difficulty. We have found hardly any difficulty in procuring recruits this year, though the numbers are vastly increased. The other two questions yet to be solved, and which are also very difficult ones, are, how to make Short Service, which, mind you, is necessary for a Reserve, applicable to India? and how to secure a flow of promotion for the officers of the Army while, at the same time, keeping faith with them as regards the promises of the House of Commons? My Lords and Gentlemen, if we ever had a War Department capable of solving those difficulties, I am quite sure that Department, of which my right honourable friend is at the head, will be able to do it. I am certain you will most heartily vote him your thanks for the kind manner in which he has taken the chair on this occasion, and join with me in hoping that he will take that deep interest in this Institution which he has shown with regard to everything connected with the Army.

The Resolution was then put from the chair, and was carried with acclamation.

MR. HARDY :—

My Lords and Gentlemen,—When I look at the clock and think of the amount of business that you have got through in three-quarters of an hour, it is an example which I could wish to see followed in another place. I am quite aware that officers, whose work is action, are very often men of very few words, indeed, I may say that almost in all cases those who are the most energetic, are those who express themselves most briefly. I shall endeavour to emulate the good example which you have all of you set, but at the same time I must say a few words with reference to my position as regards this Institution in connection with the office which I hold. Far from being like my predecessor, who occupied the building which is now the War Office in the times which Sir Lintorn Simmons has described, I have looked upon this Institution as one which is calculated to bring out and develop the talent of the young and to keep up the interest of the old in the advancing science and art which are applied now to all Military and Naval purposes. I do not think we could have a stronger proof of that than has been afforded by the Essays, for I find as competitors men so eminent as General Wilbraham and Colonel Fletcher, contending with anybody who chooses to enter the lists with them, their object being not to gain the Gold Medal for themselves, but to inform the public upon the subjects of the Essays. My opinion is very strongly this, that discussion upon these Military and Naval subjects is calculated to put us in possession of the best means of proceeding in both cases: you eliminate the weak points, you confirm yourselves in the strong ones. All Military and Naval subjects, other than those of discipline, which Sir Lintorn Simmons alluded to, are very fitly discussed, it seems to me, by those practically acquainted with them, and who bring to the knowledge of us who are not technically so acquainted with them, an amount of information which in no other so compendious a form could we obtain. It would be idle to suppose that a civilian brought into the position I now hold, could be able to acquaint himself with those works which, it appears from Sir Lintorn Simmons's statement, have only recently begun to be studied by officers themselves; but we can look at the shorter essays read previously to discussions here, and from them we obtain a sufficient insight into what is going on, to be able to form our judgments. And let me say how much I value the assistance which I have received ever since I have been at the War Office, from officers in the Army. I have never called on any military officer in any department, whether the Line, the Artillery, or the Engineers—and I may speak especially of them in the presence of Sir Lintorn Simmons—without receiving an amount of disinterested and valuable assistance which I can never be sufficiently thankful for. It is indeed impossible for anyone to hold the office I do without receiving that assistance. I believe it is given with as pure a

ing for the Army and for the benefit of the public as can possibly be conceived. There is no desire to keep back anything from anyone who holds the office I do, and it is his own fault if he does not obtain the information he needs. A great deal has been said, I think, with respect to the Library and the Journal. The Library, it seems to me, is of value not only to you, but, as Sir Lintorn Simmons has said, to the public at large, and it is a scientific library which I have no doubt finds students irrespective of the Army and Navy; because, if ever your services should be required on a great scale, you will, as far as I can understand, be obliged to call in assistance from the outside world, in engineering particularly, to develop the great works and machines which will be put in motion on such an occasion. When I read of a vessel like the "Alexandra" going to sea with thirty-five steam-engines on board, it makes me feel perfectly bewildered. Anybody who goes into a factory for the first time, and sees the wheels and spinning-machines going round him, supposes that nobody could ever get into a position to understand them, yet children do it; but I am quite sure no man can go in command of a ship like that, without an amount of scientific knowledge, which cannot be gained only by study of works, but by practical experience; and you will have to educate your officers up to the position they have to occupy in those ships, and not only that, but you will have to educate your Engineers for works of which you have hitherto had no conception. There is a development of power every day, which is become so great that you will have to consider two great questions—first, how to get strength to resist it; and next, how to get it with an amount of expenditure which the country would be justified in consenting to. One of the points I see in the Essay proposed for next year is, the economical mode of obtaining sufficient vessels for your purposes. Depend upon it that at the bottom of half the difficulties that surround you is this question of economy. It is the thing to which you must look, because if you do not do these things economically, there comes upon the nation every now and then a cold fit, and for the sake of saving money, it undoes that which you have done probably at an enormous expense. You must endeavour to do these things at a cheaper rate, and yet do them quite as well, and that is a study to which I would direct the attention of military officers as a subject for an essay some time or other—"How best you can fortify." For instance, whether you can suggest any cheaper mode of fortification than is adopted at present; because, if you cannot do that, I am convinced it will not be without great difficulty that it will be done at all. It is a question very much studied and very much considered I know, and it is one which will come to the front, because when you have these enormous ironclads sailing about the ocean and able to approach anything like an ordinary fortification without the slightest risk, you must prepare to meet them at those places which are most important to yourselves. I may mention, for instance, the coaling stations of the world, without which our Navy may sometime or other be overcome. I have ventured to say that much with respect to the question of economy, and I may carry it now a little further. You want to get into a new building; so do I. I do not suppose there is anyone who can speak more feelingly on the subject of being in unpleasant quarters than I; not that I complain personally so much, but on account of my surroundings. I think it a most unreasonable thing to expect to get a great amount of work out of people who are subject to bad ventilation, unpleasant rooms, and noises and surroundings which render the place unfit for study and reflection, where you cannot open the windows without letting in all the dust of Pall Mall. I think these are things that ought to be considered by the country, not, I am bound to say, by this Institution. Therefore, I feel as you do. I only know the War Office seems to me an admirable place for the study of finding your way under difficulties; it is a place with an intricacy of passages which I should think would be study for a military man, almost as much as a difficult country in which he was for the first time put down. But, however that may be, I am afraid you will never get a building before we do. Therefore, you should use all your efforts to persuade the country to build a War Office first, because I am sure you will never get out of the building in which you are at present before that is done. Gentlemen, I will be as good as my word. I thank you very heartily for the

kindness with which you have received me. I am very sorry that on a former occasion I was called away by a Cabinet Council; I was very much afraid I should have been to-day; but I showed at least the will to come and get the benefit of what had passed in your Institution, and that I had a deep sense of the advantages it confers on the country. As far as I am concerned, I think you are in bad quarters, and you have rightly not come to me on the subject, but have gone to the Treasury, for depend upon it at the bottom of every improvement in the country is the Treasury, whether that improvement be carried out or not.

MEMORIAL from the **PRESIDENT, VICE-PRESIDENTS** and **COUNCIL** of the **ROYAL UNITED SERVICE INSTITUTION** to the **Right Honourable the EARL OF BEACONSFIELD, First Lord of Her Majesty's Treasury.**

1. Your Memorialists having understood that application is being made to the Treasury for the appropriation of a portion of Crown land in this immediate neighbourhood for the purpose of building Museums for India and for the Colonies, desire to lay before your Lordship the claims which they consider that this important National Institution has on Her Majesty's Government for favourable consideration when any appropriation may take place; they therefore beg to submit a statement of the history of the Institution, and of its present position.

2. The Institution was established in the year 1831, under the immediate patronage of His late Majesty King William the Fourth, and although then a mere museum, with a small library, a building rent-free was granted by His Majesty's Government. In order to adapt this building, and that subsequently acquired from the Crown at a ground-rent of £205 10s., a sum of upwards of £10,000 has been expended from the funds of the Institution.

3. The Institution having become in every respect well suited to the advancement of professional knowledge, and the importance of a higher education of Officers having been fully recognized, it may fairly claim a liberal consideration from the Government. It contains a Professional Library of over 17,000 vols., universally acknowledged as the best of its kind; a well-arranged Map and Chart Room; a valuable Collection of Models (some of them of great size), of Arms, and of other Professional Objects. There is also a Lecture Theatre, in use since 1850; all of these afford excellent means for study, and for instruction in Naval and Military subjects.

4. In the Lecture Theatre, papers of great importance to the Army, the Navy, and to the Reserve Forces are read and discussed, and are then published in the Journal, which is not only greatly appreciated by Officers at home and abroad, but holds a high position in the public estimation; and the general information supplied by the Institution has been of great use to Her Majesty's Service, the advantages afforded, proving it to be an important centre of Naval and Military instruction.

5. Secretaries of State for War, First Lords of the Admiralty, and other Members of successive Governments, have borne ample testimony to the merits of the Institution, as given in the Appendix.

6. Encouraged by the favourable opinions thus expressed, your Memorialists venture to request a continued consideration of the claims which the Institution has on the Government, for the allotment of a permanent site, inasmuch as the present tenancy is liable to be terminated at a quarter's notice.

7. The course which your Memorialists hope may be adopted, and the one which they deem best calculated to secure to the Services and to the Nation the benefits now afforded by the Institution, would be to appropriate to it either the site on which it now stands, or one in its immediate neighbourhood; the first proposal would allow the present premises to be gradually reconstructed, and the building to be brought into harmony with any improvements which may be carried out in this locality.

Your Memorialists trust that this Memorial may receive your Lordship's most favourable consideration.

(Signed) **GEORGE, President.**

ROYAL UNITED SERVICE INSTITUTION,
WHITEHALL YARD,
 20th January, 1877.

APPENDIX.

EXTRACTS FROM THE SPEECHES MADE BY THE CHAIRMEN AT THE
ANNUAL GENERAL MEETINGS, FROM 1860-76.

3rd March, 1860.

The Right Honourable EARL DE GREY AND RIPON, Under Secretary of State
for War:—

"I assure you I entertain the very highest appreciation of the value of the services rendered by this Institution, especially of late years, to the United Services of the Army and Navy."

2nd March, 1861.

His Grace the DUKE OF SOMERSET, First Lord of the Admiralty:—

"I may say it is of the greatest value to have an Institution of this kind, where lectures on Naval and Military Science are given, because a great deal of information might otherwise be lost."

1st March, 1862.

The Right Honourable Sir GEORGE CORNEWALL LEWIS, Bart., M.P., Secretary
of State for War:—

"I have great gratification in saying that the benefits of the relations between this Institution and the Government have not been one-sided; but that the Government, on a late occasion, received assistance from this Society, by some information with respect to a port in North America at a time when we contemplated the unhappy event of a rupture with the United States. . . . We feel the advantage which we derived from having access to the well-stored special library of this Institution, furnishing us with information of which the Government may at a moment of emergency not be in possession."

14th March, 1863.

Admiral the Honourable Sir FREDERICK W. GREY, K.C.B., Lord of the
Admiralty:—

"I quite agree with the remarks of gentlemen who have preceded me, that it is to the *lectures and discussions* that most importance should be attached. I think that the want of some arena in which professional questions can be calmly and dispassionately discussed is most strongly felt, particularly since the commencement of the present session of Parliament."

"The different members of the Government and the heads of the Departments who are engaged in carrying out these important improvements which the advances of science render necessary, must have acquired a great deal of information upon that occasion." (Discussion on the question of Rifled Ordnance.)

5th March, 1864.

General the Honourable Sir EDWARD CUST, K.C.H.

"I allude, not only to the facility this Institution gives to the younger members of the profession to acquaint themselves with the progress in naval and military science, but more especially to the valuable information which it affords to those entrusted with the administration of the Army and Navy, information which they could not otherwise obtain."

4th March, 1865.

His Grace the DUKE OF SOMERSET, K.G., First Lord of the Admiralty.

"I can assure you that in acting with the Secretary of War in the application to the Treasury, for a joint grant to this Institution, I did nothing more than what I considered my duty as First Lord of the Admiralty.

"If you look to the present position of the Institution, and to what it has done during the last three or four years, and see the attention which it has drawn to matters of science connected with the Army and Navy, you will see the great and growing value of this Institution. It was in that view that I recommended to the Treasury that the Admiralty and the War Office should combine to make this grant of £600 out of the Estimates."

2nd March, 1867.

The Right Honourable Sir JOHN SOMERSET PAKINGTON, Bart., G.C.B., First Lord of the Admiralty.

"The extraordinary circumstances which have marked the progress of everything connected with the Science of War during the last few years, certainly do tend to give a new and completely additional value to an Institution like this. Whatever it may have been at first, it is impossible to reflect upon these subjects to which I am now in these words referring, without feeling that such an Institution is calculated to promote national objects of the very first importance. I sincerely think that an Institution of this character is entitled, beyond all question, to the warmest and most sincere encouragement of the Government. I think the Government of this country is bound gratefully to acknowledge the services of such an Institution as this, and to give it every due and proper encouragement.

"And if its objects could not be satisfactorily carried out without an increase of assistance from the public funds, I am quite willing to express my opinion that that assistance ought to be given."

7th March, 1868.

Major-General the Right Honourable SIR H. K. STOKES, G.C.B., G.C.M.G., Controller-in-Chief.

"I wish to express publicly the great interest which I take in the prosperity and usefulness of this great Institution. Having been a great deal abroad, and having been somewhat in communication with foreign armies, I can confirm all that has been said by the honourable and gallant gentleman who seconded the first resolution as to the high estimation in which the Journal of the Proceedings of this Institution is regarded by Officers of those armies. Articles are translated and constant reference is made to them. . . . I can only repeat, which I do most sincerely, that it will be my endeavour, at all times and under all circumstances, to assist to the best of my ability the interest of this great Institution."

6th March, 1869.

The Right Honourable H. CULLING-EARDLEY CHILDERS, M.P., First Lord of the Admiralty:—

"The connection between the Government and an Institution of this kind ought to be of the most friendly, and, I may say, of the most cordial character, and so far as it in me lies in any way to promote that object, you may on all occasions be quite certain of my best endeavours to do so. Gentlemen, I look upon this Institution, if I may be allowed to say so, as a sort of neutral ground of professional enquiry, connected with the two services. We have political enquiries in the two Houses of Parliament, and we have departmental enquiries at the War Office and Admiralty; and you all know that those enquiries and researches cannot be altogether dissociated from questions of pure politics or questions of administration. . . . No one who has had an opportunity, as I have, of perusing the most valuable papers that have been read here, which bear directly upon questions dealt with in Parliament and in the departments, can fail to be greatly benefited, and I believe what is done here influences in a very remarkable degree many things which are done elsewhere."

5th March, 1870.

The Right Honourable EDWARD CARDWELL, M.P., Secretary of State for War.

"I feel extremely the importance of this Institution, and am very much impressed with the feeling which has been expressed in some speeches, viz. :—that the Government derives the greatest advantage from the labours of those gentlemen who contribute to the literature of this Institution. We live in a time when pure science, and applied science, and historical investigation, contribute probably more than at any former period, to the real progress of the military profession. Many of the most interesting subjects which afterwards occupy practical attention find the first germs of their existence in the lectures of this Institution. . . . I do not know that I ought to condole with you on the prospect of being disturbed in your premises, because I sincerely hope that, if, in consequence of any improvements that may take place in this neighbourhood, you are disturbed, the result may be that I may have the pleasure of seeing you in a more commodious place, and one in which your abundant treasures may be properly exhibited."

4th March, 1871.

The Right Honourable the VISCOUNT HALIFAX, G.C.B., Lord Privy Seal.

"I have had a good deal to do during a rather active life, so that I have not had time to pay much attention to the concerns of this Institution. But since Captain Burgess was good enough to wait upon me to ask me to take the Chair on the present occasion, I have looked through a number of papers which he left with me, and I must say that reading over those papers has impressed me with the very highest opinion of the valuable nature of this Institution. My belief is that the information which is collected here, and the results of the collision of opinion which takes place in the discussions in this room, will be of the greatest possible utility to both the Naval and Military Departments of the Government. We are living in a period of constant and rapid transitions. Thirty-five years ago I first became connected with the Admiralty. Nothing in the world exists there now which existed in those days. In thirty-five years everything has changed, from the truck to the keel, I was going to say; and it is almost impossible for any one, two, or three men to keep up with the rapidity of these changes. I see, in looking over the papers which have been discussed, that a great number of valuable suggestions have been made by various members, and discussed with great ability, and the result of those discussions cannot but be most useful to those who have to administer the Naval and Military affairs of this country. The Navy is the department with which I was first connected, and I still continue to take a deep interest in its affairs. I am sure that many of the questions which are discussed now, and which must be discussed for many years to come in this Institution, will be treated with the greatest consideration by the Government. The same remark will apply to the Army, because the state of transition there is in many respects quite as rapid as in the Navy. Since I have known the Army, it has been supplied with four or five different weapons, to say nothing of the field guns. Questions relating to the Army have been submitted to the experience of Members of this Institution, and the result of that experience has been brought to a focus within these walls; and I cannot but think that in that respect this Institution is of the greatest possible service to those who have to administer the military resources of the country. Well, in this state of things, gentlemen are likely to be called upon in one part or another of the country to take part in home defence; and we must come to learn from professional officers those duties which we cannot have the opportunity of learning at home, and which we may learn here with great advantage. I am glad to see that a personal friend of mine gave a very able lecture on the subject of 'Military Organisation' a short time ago. Although we cannot boast the experience of professional officers, I am glad to see that a country gentleman has read a paper here on a subject of great interest. I think those who are called upon to bear arms in defence of their country will learn a great deal from the lectures that are given here. I am glad to find from the Report, that you have an increased number of Members, increased efficiency in

various ways, in additions made to the Library, and in other means of obtaining and improving information. I do trust, though there is not much chance of your being disturbed this year, that before long you will be put, not into a more convenient site—for this is a very convenient site—but at any rate into a site at least as convenient, and from which you are not likely to be disturbed.”

2nd March, 1872.

Field-Marshal His Royal Highness the DUKE OF CAMBRIDGE, K.G., &c., &c., &c.,
Commanding-in-Chief, President of the Institution :—

“Gentlemen,—After having had this Report read by the Secretary, I do not think there is much left for me to say with regard to the present position of the Institution. I am happy to congratulate you that, upon the present occasion, we meet under more favourable circumstances than when we last assembled in this theatre, viz., for the special purpose of considering what was to become of the Institution. One point was clearly brought out as the result of that meeting; namely, that the value of this Institution has been fully appreciated not only by the public, but especially by the Government, with which we are very essentially concerned, inasmuch as our tenure of this building, as you have already heard, depends mainly upon the course Her Majesty's Government may think it right to adopt. On that occasion I ventured to counsel you—and I am happy to say that that counsel was supported by everybody present—that we should accept the ‘notice to quit’ in anything but an unfriendly spirit; that we should make our opinions known; and that it should be made fully apparent how essential it was to the interests of the Institution that it should be continued on its present footing. One very important point should not be overlooked, viz., that it is essential than an Institution of this description should be situated in a locality accessible to every Member. This is a point of such importance, that I trust it will not be lost sight of in any arrangements which may hereafter be made. Meanwhile, thanks to the good feeling that has been evinced towards us, we have at least gained this great advantage, that instead of being called upon to leave on the 5th of April next, a year's grace has been given us, and the notice has been extended to the 5th of April, 1873. There is no doubt that that arrangement gives us a great advantage. It gives us time to consider what is best to be done; and it gives us the opportunity of intercommunication with the Government, and of seeing if our interests and their views cannot be brought in harmony. I do hope that, between the present date and the period proposed for our departure, some means will be found for letting us remain where we are, which certainly would be the most convenient and advantageous course for the Institution; particularly considering the amount of money which has been expended in enlarging and improving the premises; or, if we should fail in that, I trust that we shall meet with a site in immediate contiguity to the place in which we are now assembled. The advantage of the meetings which take place in this Institution for the reading of papers and for discussions has been generally acknowledged, not merely by the official world, but by those who take, or ought to take, an interest in the objects of the Institution. We have a proof of this in the Report which has just been read. You heard that an addition of ninety-one Members was made last year. I look upon that as a most interesting fact. It shows that there is a general interest in the subjects that are discussed here, as being of advantage to the two Services. It shows, too, that the exchange of thought and opinion which the discussions produce, is of the greatest value. I have no doubt, if we can only retain the present site, or secure one equally good, that the continued opportunity for the interchange of thought which takes place here on neutral ground, will be so extended, that, not only the two Services, but the Government itself, will derive the greatest possible advantage from it; because it is here that subjects of great importance can be freely and fairly discussed; they can be discussed on a very different basis from what they can be in an Office. Here everybody is allowed to express his opinions. It is very desirable that those opinions should be expressed with great moderation, great thought, and great good feeling. I am happy to say that that spirit has always pervaded our meetings. It does not at all follow, because two people do not think alike that they

should not be good friends. It would be the greatest possible mistake were it otherwise, particularly in discussing any merely professional question. There must be a variety of opinions; it is desirable that it should be so, and it is quite desirable that proper vent should be given to those differences of opinion. I used the words 'proper vent,' because there are two ways of expressing opinions. Here opportunity is given to express the thoughts which every man has a right to entertain, and, as I have said, the greatest good feeling and moderation prevail. But there is another way which is not quite so satisfactory, where thoughts are expressed sometimes even in an offensive manner. That course I greatly deprecate. That is not the system upon which our deliberations are conducted, and I trust it will never be permitted to find a place in them. I have a conviction of the vast importance, not only to the two Services, but to the public generally, of this Institution. Under these circumstances, I trust that, between this and next year, some arrangement may be made to secure, on even a more firm basis than hitherto, the Royal United Service Institution, which has now existed for a considerable time, and with great advantage, I think."

1st March, 1873.

The Most Honourable the MARQUIS OF LANSDOWNE, Under Secretary of State for War:—

"I esteem it a very great privilege to have been allowed by the Council of this Institution to take the Chair to-day. It has often occurred to me that one of the great advantages of public life—mine has been a very brief experience of such a life, but still it has convinced me of it none the less—is that it affords you opportunities of bringing yourself into contact with numbers of men, classes of men, associations of men, whom you would not otherwise have the privilege of meeting and knowing; and I can assure the members present here to-day, that there is no association whose acquaintance I am more pleased to make, than that of the Royal United Service Institution. I say this not only as one of the general public who watch with an eye of approval and interest the energetic endeavours of this Institution, but I say it also as having the honour of being connected with one of the Public Departments, which will, I hope, continue always to preserve with this Institution those amicable relations which I am convinced subsist between them. Added to this, I think I may congratulate myself upon having been allowed to occupy your Presidential Chair upon the occasion of certainly one of the most successful meetings—I mean not so much in point of attendance, but successful in point of the condition of things which the Report discloses—that has ever been held. We have not only a very large and rapid increase in the number of members of the Institution, but we have a very considerable financial increase as well; and I dwell with greater satisfaction upon this, because when I see the funded property of the Institution gradually increasing, it occurs to me that, should that unfortunate contingency which has been already referred to to-day ever overtake us, the Institution will find itself with funds of its own whereby to second the effort which I believe will be made by any Government—whatever party it may belong to—to secure for the Royal United Service Institution a firm basis for the future. A reference to pledges which have been already given by persons holding high official positions in the present Government, is certainly reassuring on this subject; and I am convinced that those pledges were not only readily given, but will be honourably redeemed when the day comes.

"Then, Gentlemen, having had the honour of filling the Chair to-day, I feel tempted to say a few words to you about your Institution itself, and I must confess that it is with some hesitation that I address myself to the task, because I run no inconsiderable risk of finding myself talking to you about a subject with regard to which you are very much better informed than I am. But there are one or two considerations that force themselves upon my mind, and those considerations I will, with your permission, very briefly state. We live in an age of great scientific progress. Inventions and discoveries succeed each other with remarkable rapidity, and for that reason increased scientific culture has become at once indispensable and more popular than it ever was before. We see that in every trade, in every pre-

session, in every class of society; and I think this Institution may not unreasonably congratulate itself upon having for more than forty years taken the lead in that movement in the direction of scientific culture, which has added so much to the resources and strength of our country. . . . This Institution has facilities for promoting scientific culture which perhaps no other Institution in the world has, for this reason, that we have here a neutral territory between science on the one hand and professional and practical life upon the other. The merits of the one frame of mind dovetail with the merits of the other; each corrects the fault of the other; and I think you get a more practical use of science in an Institution like this, than perhaps you do under any other conceivable circumstances.

"I will not sit down without referring to the connection which has so long subsisted between the War Department and this Institution. I am happy to say that that connection is one on which both the War Department and the United Service Institution may reflect with pleasure. There has never been any approach to dependence between the two, but there has always been the utmost goodwill. We feel that we gain not only by the use made by Officers connected with the War Department of your valuable premises and of those facilities which you offer to them, but we feel that we gain in that wide diffusion of cultivated spirit which no Act of Parliament and no regulations can produce, but which the spontaneous efforts of this Institution have succeeded in very firmly establishing. My Lords and Gentlemen, I have only to thank you for having allowed me to occupy the Chair to-day, and to assure you it will be a great pleasure to me to look back upon my introduction to this Institution."

7th March, 1874.

Admiral Sir ALEXANDER MILNE, G.C.B., Lord of the Admiralty:—

"My Lords and Gentlemen, I beg to thank you for the honour you have done me in according me a vote of thanks. I can only say that I am exceedingly grateful to the Council for having done me the honour of asking me to preside on this occasion. I accepted that invitation with the greatest pleasure; because, though I have not been participating as an active Member of this Institution, yet it is one that I have for years advocated as one of the most useful and practical for both Services. I have read with great attention, and with much interest, the valuable Journals which are published here. They contain matters of public interest both for the Army and Navy, as well as for civil life, and I can certainly concur in all that has been said to-day about our being under a deep obligation to the authors of those Papers for the address which they have displayed, and for the ability with which they have written them. But the usefulness of this Establishment is not confined to the discussions which take place here. I agree in every word which the gallant General said with regard to free discussion. I think it is for the interest of our professions that those who come here should clearly and explicitly state their views in that straightforward manner which cannot be objectionable to any Government. Besides the privilege of the Lectures, Members of this Institution have access to what is perhaps the finest professional library in the country. It is a great credit to the Members of the Council, and to those who have passed years in the discharge of their duties here, that this Establishment has been raised to the position which it now holds, that it has the finest library in the country, that it receives from foreign nations their principal works, and that both the War Office and the Admiralty are ready to come forward to render such assistance as they can in the way of books and charts. There is another way in which this Institution exercises a widespread influence. I believe that the Papers published here have great influence in our respective professions. . . . I have pleasure in mentioning that, because the Essay (Junior Naval Professional Association), which is now printed, does him (Lieut. Noel, R.N.) great credit; and I also take the opportunity of referring to the subject as showing the influence that this Institution has over the professional Officers of the Navy, and I believe of the Army also. I have to return you thanks for the compliment paid to me, and to assure you that my desire and my anxiety have been to forward the interests of our respective professions, and also to do all I could for this Institution."

6th March, 1875.

The Right Hon. the EARL OF PEMBROKE, Under Secretary of State for War (in the absence of Mr. GATHORNE HARDY):—

"Before I say anything on the subject of the motion, I wish just to state that no one I am sure can be more disappointed at his absence to-day than Mr. Hardy himself. He was summoned away, as has been said already, at the last moment, and with great regret that he was not able to attend. I am not as well acquainted with this Institution as I hope to be in future; but it does not require a very deep insight into its working, or very great experience, to see the very great advantages which it possesses, and the enormous capabilities it has both for acquiring and diffusing information. I most thoroughly concur in all that has been said about the very great service which it has rendered and does render, and I hope always will render, to the Government. In saying this I wish to call particular attention to one point, viz., that of the Gold Medal. The amount of help that will be afforded to the Government by picking the best brains of the whole army upon such subjects as that which has been chosen for this year cannot, I think, be exaggerated."

4th March, 1876.

Admiral Sir ALEXANDER MILNE, G.C.B., Lord of the Admiralty:—

"Before the business of the meeting commences I think that I should state the reason why I have the honour of occupying the Chair on this occasion. It was the intention of the First Lord of the Admiralty to have been here this afternoon, but in consequence of a meeting of the Cabinet at 12 o'clock, he is unable to be present. The Council have been kind enough, therefore, to ask me to preside, and I shall be very glad if I can be of any service. . . . I am quite sure of this, the more young Officers write upon technical subjects, avoiding all questions of discipline, and not making use of confidential papers, the more it will be for the good of the Service itself, and also of the military profession. I trust you will allow me to add a few words with regard to the Institution itself. I think nobody can form any other opinion than that it has been of the greatest professional use both to the Army and Navy, and that there are matters discussed and papers written in this Institution by members of both Services which are exceedingly advantageous, and hold forth not only old but new views upon all these particular questions now arising in our respective professions. To whom are we indebted for all this? We are indebted to the Chairman, the Council, the Secretary, and the other professional Officers of the United Service Institution. These gentlemen are catering for the public good, and I think it is due to them that, as the Chairman of this meeting, I should express, as representing you, our satisfaction at the manner in which the Chairman and the Council have so kindly undertaken their duties, and have maintained and kept up this Institution. We have expressed, through a Resolution, a vote of thanks to those Members who are leaving the Council; but I think it is due to those who still remain that their services should not pass unnoticed. I conclude by expressing my own personal feeling that whatever I can do, or the Admiralty can do, to support this Institution or increase its usefulness, we shall be very glad to do."

NAMES OF MEMBERS

WHO JOINED THE INSTITUTION BETWEEN THE 4TH APRIL AND
THE 2ND MAY, 1876.

LIFE.

Ponsonby, J. G., Lieut. 49th Regiment.	Inverurie, Lord, Captain Royal Aber-
Cleveland, Henry F., Captain R.N.	deenshire Highland Militia.
Curzon-Howe, Hon. A. G., Lieutenant	Wood, Thomas, Lieut. Gren. Guards.
R.N.	Fife, James G., Colonel R.E.

ANNUAL.

Nettleship, W. F., Captain 9th Surrey	Carter, Robt. Brudenell, Esq., F.R.C.S.,
Rifle Volunteers.	late Staff Surgeon A.M.D.
Hume-Spry, G. F., M.D., Surgeon 2nd	Bomilly, Frederick W., Lieut. Scots
Life Guards.	Fus. Guards.
George, O. W., M.D., Surgeon-Major	Pym, Francis, Lieut. 1st Life Guards.
1st Life Guards.	Murray, A. M., Lieut. R.A.
Clinton, Lord E. W. P., Major Rifle	Mildmay, H. P. St. J., Lieut. Gren. Gds.
Brigade.	Williams, C. G., Lieut. R.N.
Wegg-Prosser, J. F., Lieut. Rifle Brigade.	

WHO JOINED THE INSTITUTION BETWEEN THE 19TH JUNE AND
THE 31st DECEMBER, 1876.

LIFE.

Robertson, Charles G., Lieut. Edin-	Newark, C. W. S., Viscount, Lieut.
burgh Militia.	Gren. Guards.
Birch, Lightwood T., The King's Own	Warry, A. W., Lieut. R.N.
1st Stafford Militia.	Branson, C. E. D., Captain H.M.I.M.F.
Noake, Maillard, Major New Zealand	Pole, Arthur C., Captain 13th Hussars.
Militia.	Loyd, Frank K., Lieut. 55th Regiment.
Corry, Alvin C., Lieut. R.N.	

ANNUAL.

Fowler, C. J., Lieut.-Colonel R.E.
 Lindsay, Charles, Lieut. R.N.
 Chambers, Francis, Lieut.-Colonel 1st
 King's Own Stafford Militia.
 Madden, Geo. C., Lieut. 1st West India
 Regiment.
 Parker, R. J. H., Captain R.E.
 Smart, Geo. J., Major R.A.
 Foster, C. E., Captain 58th Regiment.
 Turnbull, C. F. A., Lieut. 32nd Regt.
 Johnston, D. A., Lieut. R.E.
 Greenhill, B. Cecil, Lieut. Kent Art.
 Militia.
 Weldon, F., Major Madras Staff Corps.
 White, W. L., Captain 4th E. York
 Artillery Volunteers.
 Elyard, James, Major 2nd Royal Surrey
 Militia.
 Coles, Chas. Horsman, Captain 1st
 Surrey Artillery Volunteers
 Stoddard, Thomas H., Major-General,
 Unatt.
 Cameron, V. Lovett, C.B., Com. R.N.
 Tompkins, John, Paymaster R.N.
 Rotton, Arthur, Lt.-Colonel, late R.A.
 Watson, A. J., Lieut. 12th Regiment.
 Main, Robert, Esq., Royal Naval College,
 Greenwich.
 Toulmin, Alfred H., late Lieut. 65th
 Regiment.
 Greg, Edward H., Captain, late 4th
 Royal Lancashire Militia.

Murray, K. D., Captain 89th Regiment.
 Taaffe, C. R., Lieut. 16th Lancers.
 Chadwick, Edwd., Lieut. 16th Lancers.
 Davis, J. E., Captain R.N.
 Eden, M. R., Major, Unatt.
 Baumann, C. E., Lieut. 2nd West India
 Regiment.
 Messervy, G. T., Captain 21st Middlesex
 Rifle Volunteers.
 Norman, C. B., Captain Bengal Staff
 Corps.
 Hoste, Geo. H., Esq., Admiralty.
 Clarke, William, Captain, 2nd Middle-
 sex Militia.
 Boyce, E. J. G., Lieut. R.E.
 Bedford, F. G. D., Captain R.N.
 Shaw, William, Captain 2nd Stafford
 Militia.
 Forster, Charles, Captain, 2nd Stafford
 Militia.
 Hall, Geo. C., Lieut. 2nd Stafford Militia.
 Bagnall, T. N., Lieut. 2nd Stafford
 Militia.
 Heyland, J. R. K. L., Lieut. R.A.
 Hamilton, R. V., C.B., Captain R.N.
 Ballantyne, J. G., Captain 11th Regt.
 James, F. W., Lieut. 9th Regiment.
 Druitt, Percy S., Lieut. 101st Regiment.
 Wyndham, W. G. C., Lieut. 21st Hussars.
 Graham, D. A. G. C., Captain 16th
 Lancers.

ADDITIONS TO THE LIBRARY AND MUSEUM DURING 1876.

LIBRARY.

*Where London is the place of Publication, the word London is omitted.
Where no size of Volume is mentioned, the Work is in 8vo.
Where no date is mentioned, 1876 is the year of publication.*

BOOKS PRESENTED.

- ALBEMARLE**, The Earl of, General. *Fifty Years of my Life.* 2 vols. *The Author.*
- BARLOW**, H. C., M.D. *Critical, Historical and Philosophical Contributions to the Study of the Divina Commedia.* 1864. *The Author.*
- BATTALION** Re-organization. By a Field Officer. Pamph.
- CANADA**. Report, Canada Militia. 1875. Ottawa. *Isaac Brock Stanton, Esq.*
- CHINA**. Translation of the Peking Gazette. 1874-75. 2 vols. *Capt. Alex. Man.*
- DE MARTENS**. An Essay on Privateers, Captures and particularly on Recaptures. Also a Discourse on the Rights and Duties of Neutral Powers. Translated by T. H. Home. 1801.
- DULAGUE**. *Leçons de Navigation.* Rouen, 1791. *Gen. Sir Wm. Codrington, G.C.B.*
- DUFFLA**. Medical History of the Expedition. Fol. 1875. *D. T. Gen. J. T. C. Ross, F.R.C.S.*
- Ditto Hills.* Account of Part of the. Fol. Calcutta, 1875. *Anon.*
- DE FONBLANQUE**, E. B. Political and Military Episodes in the latter half of the 18th Century, derived from the Life and Correspondence of the Right Hon. John Burgoyne, General, Statesman, and Dramatist. *The Author.*
- DILLON**, The Hon. Arthur. A Winter in Iceland and Lapland. 2 vols. 1875. *The Author.*
- DALTON**, J. C., Lt. R.H.A. Questions and Answers for the Use of Non-commissioned Officers and Gunners of Batteries of Horse and Field Artillery armed with the 9 P.R. and Rifled Gun of 6 cwt. Cork. *The Author.*
- DENMARK**. Four Sheets Topographical Atlas. *The Danish War Minister.*
- EXAMINATIONS**. Report, Final Examination, Staff College, Dec. 1875. *Ditto.* Report on the Final Examination to the Staff College, Dec. 1876. With Copies of the Examination Papers. *The Director-General of Military Education.*
- FRASER**, T., Capt. R.E. The Defence of a Position Selected as a Field of Battle. Royal Engineer Prize Essay for 1875. *The Writer.*
- FAWCUS**, G. Small Pocket Field Drawing Board. *The Designer.*
- FRANCO-German War**. 1st Part, 8th and 9th Sections; 2nd Part, 10th Section. *The Secretary of State for War.*
- GERMAN EMPIRE**. The Armed Strength of. Part I., Organisation and Administration, with Map. By Capt. F. C. H. Clarke, R.A. *The Secretary of State for War.*
- GOLDSMID**, Sir F., Gen. Eastern Persia. 2 vols.
- GUY**, Dr. F., R.S. The Orimean War, or the Turks avenged. Pamph. *The Author.*
- HALL**, Sir William H., Admiral, K.C.B. Our National Defence. Pamph. *The Author.*
- HARCUS**, W. South Australia; its History, Resources and Productions. *F. S. Dutton, Esq., C.M.G.*
- HOGG**, Jabez. Impairment or Loss of Vision from spinal shock or concussion. *The Author.*
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- INGLIS**, Col. R. E. Notes of Lectures on Iron Fortification. 1875. *The Commandant S.M.E. Chatham.*
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- ITALY. Der Krieg in Italien, 1859.
Zweiter Band. Wien.
The Austrian War Minister.
- MONTEIRO, J. J. Angola and the River
Congo. 2 vols. 1875.
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- MOUNTED RIFLES. Report of Annual
Meeting of 1st Hants Mounted Rifles.
18th May, 1876. *Col. Bower.*
- NAVY. Admiralty Regulations, 1790-
1826 and 1844.
Gen. Sir Wm. Codrington, G.C.B.
- NAVY:—
Naval Instructions. 1806.
Extract from Marine Treatise. 1758.
Duties of a Deputy Judge-Advocate.
1805.
Essay on Naval Tactics. 1790.
Naval Force of Great Britain. 1791.
Le petit Neptune Francais. 1793.
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Naval Courts Martial, M'Arthur's.
1792.
Ship Master's Assistant. 1792.
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1787.
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et Rades de la Mer Mediterranée.
Account of the Proceedings of the
Squadron effecting the escape of the
Royal Family of Portugal.
Mrs. Brownlow Knox.
- NETHERLANDS. 7th vol. Military
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By Capt. F. C. H. Clarke, R.A. With
Map. *The Secretary of State for War.*
- PANORAMA, Military, or Officer's Com-
panion. 3 vols. for 1813-14-15.
General Sir Edward Hodge, K.C.B.
- PRICE, Capt. R.N., M.P. Navigation
of Her Majesty's Ships. Pamph.
The Author.
- RAIKES, G. A., Capt. Historical Records
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Third West York Light Infantry.
The Compiler.
- RECORDS, The Royal North Gloucester
Militia. Capt. Cripps. *The Author.*
- ROYAL ENGINEERS. Professional Papers.
Vol. 23. *Col. Hutchinson, R.E.*
- RUSSIA. The New Law regulating
Military Service in Russia.
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- ST. JOHN OF JERUSALEM, the Order of.
Report, Roll, and Brief of.
Ditto. The History of Eagle, in
the County of Lincoln, a Commandery
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Capt. Perrott, East Kent Militia.
- SPROT, J., Col. Standing Orders of the
91st Highlanders, with Addenda and
detached Appendix of Forms.
The Compiler.
- SWEDEN, Krigs-Vetenskaps-Akademiens
Handlring och Tidskrift. 1875-76.
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- THE BRITISH ARMY AND MISS NIGHTIN-
GALE. Paris. 1874. *Dr. Shrimpton.*
- THE Cabinet Council and the impending
War. By an Englishman. Pamph.
Anon.
- TORRINGTON, H. St., R.H.A. Swim-
ming Drill. Pamph. *The Author.*
- TRINITY HOUSE FOG SIGNALS. Reports
on a Special Gun, Gun Cotton and
Rockets for Signal Purposes.
Admiral Sir Richard Collinson.
- TROTTER, H., Capt. R.E. Account of
the Survey Operations in Eastern
Turkestan. 1873-74. Fol. *The Author.*
- UNITED STATES. Official Army Register,
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The Chief of Ordnance.
- Medical Statistics of the Provost-
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War Department, Washington.
- United States Geographical Surveys
West of 100th Meridian. Vol. 3,
Geology; 5, Zoology.
Explorations across the Great Basin
in Utah in 1859. Folio.
Exploring Expedition from Santa
Fé to junction of Grand and Green
Rivers. 1859. Folio.
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roll, Montana Territory, on the Upper
Missouri, to the Yellowstone National
Park, and Return, made in the
Summer of 1875. By Captain Lud-
low, Engineers.
The Chief of Engineers.
- Historical Sketch of the U.S. Naval
Academy. By Professor James
Russell Soley, A.B.
Rules, Register, &c., for the same.
Admiral Rodgers. U.S.N.

UNITED STATES—

Sailing Directions—

No. 59. The Coasts of Chile, Bolivia and Peru.

60. Coast and Ports of the Bay of Biscay.

Commodore Wyman, U.S.N.

VOYLE, Gen. R. A. A Military Dictionary. 3rd edit. *The Author.*

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John F. G. Ross, of Bladensburg, Coldstream Guards.

WEBSTER, R. G., Capt. The Amalgamation of the British Army. *The Author.*

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DALTON, Lt. } Book of Reference. *The Authors.*

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The following Works were presented by J. W. FLEMING, Esq., F.R.C.S., late Surgeon-Major 4th Dragoon Guards, since deceased.

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24. Purchase Commission—Appropriation Account for 1874-5.
35. Estimates for the Year 1876-77 (with Index).
36. Variation of Numbers, &c.—Statement and Explanations respecting.
37. Colonies—Statement of Amounts included in the Estimates for.
49. Appropriation Account and Statement of Surpluses and Deficits for 1874-5.
67. Manufacturing Establishments—Accounts for 1874-5.
71. Purchase Commission—Estimate for 1876-7.
93. Ashantee Expedition—Vote of Credit—Supplementary Estimate, 1875-6.
112. Colonels, &c.—Number of, in certain Years.
127. Commissions—Returns relating to.
140. Majors, Royal Artillery—Return of Applications for Arrears of Pay, by Majors who served in India.
148. Soldiers in Prisons—Return respecting, 1869 to 1875.
166. Fortifications (Defences Loan, 1874-5)—Account relative to.
168. Special Allowances—Return of, for the Foot Guards, included under Vote 1, Sub-head E, of Army Estimates.
178. Military Savings Banks—Account for 1874-5.
190. Soldiers Pensioned in India—Number of.
198. Ashantee Expedition (Vote of Credit)—Appropriation Account for 1874-5.
200. Purchase Commission—Estimate of Vote "On Account" for 1876-7.
221. Miscellaneous Expenses—Return respecting Allowance of £11,079 15s. given to the Guards' Stock Purse.
286. Furlough and Retiring Regulations—Returns of, 1796, 1868, and 1874.

Army—

301. Soldiers appointed to Civil Offices—Return relating to.
329. Soldiers, &c. (Families in Receipt of Relief)—Abstract Return relative to.
355. Prize Money—Account of, 1809 to 31 March, 1876.
364. Staff Appointments—Return relating to.
387. Charges defrayed by the War Office on Account of India—Estimate for 1876-7.
388. Soldiers Tried before Civil Power—Return of, 1870 to 1874.
407. Fortifications, &c.—Account relative to, to 31 March, 1876.
413. Arrears of Pay—Return—Applications for.
414. Chaplains, &c.—Return of Chaplains (Episcopalian Protestant) serving in Ireland, &c.
420. Enlistments—Number of, in each Sub-district, from 1 April, 1873, to 31 March, 1876.
427. Militia and Militia Reserve—Return showing the Strength of Particular Regiments at certain periods.
457. Reserve—Return showing Strength of, on 1 July, 1876, with reference to the Mobilization of Second and Fifth Army Corps.

Navy—

1. Merchant Shipping Act, 1875 (Inspectors)—Papers relative to the Appointment of.
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3. Merchant Shipping Act, 1875 (Vessels Detained)—Return of.
4. Ditto—Papers relative to the Operation of.
5. Ships Detained as Unseaworthy (Merchant Shipping Acts Amendment Act, 1871)—Further Correspondence relative to.
25. Greenwich Hospital and School—Appropriation Account for 1874-5.
44. Appropriation Account and Statement of Surpluses and Deficits for 1874-5.

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Navy—

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57. Merchant Shipping Act, 1875 (Load Line)—Reports relating to.
58. Rule of the Road at Sea—Papers relative to.
63. Fleetmen on the "Vanguard"—Return relating to.
77. Suez Canal Tonnage Dues—Return of, paid by English Ships of War and Transports, in 1875.
79. Royal Naval Reserve (Scotland)—Report of the Inspection of.
84. Works, 1876-77—Memorandum explanatory of Vote 11 of the Navy Estimates (*with a Plan*).
87. "Mistletoe" Inquiry—Baron Bramwell's Letter on the subject of.
89. Harbour, &c., Bills—Reports of the Board of Trade, viz:—
 - 89-(1). London, Brighton, and South Coast Railway (Various Powers).
 - 89-(2). Queenborough Harbour.
 - 89-(3). South Eastern Railway.
95. Supplementary Estimate—Statement of Excess for 1874-5.
98. Loss of the "Vanguard"—Papers relating to.
- 98-i. Ditto—Further Papers (*with a Plan*).
104. H.M.S. "Devastation"—Reports of the behaviour of, on passage from England to Malta.
107. Programme of Works—Return of, for 1876-7.
117. Merchant Ships (Health of Crews)—Papers relating to recent Cases of Scurvy.
118. Merchant Shipping Act, 1873 (Compensation)—Return of Claims for.
132. Religious Denominations—Return respecting.
141. "Alberta" and the "Mistletoe"—Papers relating to the Collision between.
147. Screw casing—Reports showing results of Trials of (*with Plans*).
151. Lighthouses, &c. (Local Inspections)—Reports relative to.
157. Victualling Savings—Return respecting.

Navy—

159. Retirement of Officers—Return of, since the Order of February, 1870.
176. Suez Canal (Surtax and Tonnage)—Return relative to.
180. Victualling Accounts, 1874-5—Return of.
181. Accounts (Shipbuilding and Dockyard Transactions, 1874-5)—Balance Sheet and Accounts.
182. Ditto (Manufactures and Repairs in Dockyards, 1874-5)—Balance Sheet.
183. Surpluses and Deficits, 1874-5—Retabulation of the Statement of.
187. Merchant Shipping Legislation (Canada)—Papers relating to.
196. "Britannia" Cadets—Reports relative to.
201. Crime and Punishment—Returns of, for 1874.
204. Victualling Savings—Report of the Admiralty Committee on, 1870.
222. Training Ships—Revised Instructions for the Entry of Boys.
224. Ironclads—Return relative to.
225. Distribution of Forces—Return showing, on 1 April and 1 October, 1874 and 1875.
235. Office of Lord High Admiral—Names of Persons who have held the Office, from 1660.
238. Unseaworthy Ships (Transfers)—Papers relating to.
239. Ships Built—Return respecting, 1864-5 to 1875-6.
245. Officers holding Civil Appointments—Return relative to.
280. Admiralty Trial of Coal—Return of, recently made.
283. Dockyards (Increase of Establishment)—Circular Letter relative to.
285. Ship "Star of Peace"—Dates of Proceedings in the case of The Queen v. Captain Richard Boaden.
297. Vessels completed since 1855—Return of.
- 297-i. Ditto—Index to Return.
298. Corporal Punishment—Return of, 1869 to 1874.
310. Boys—Return relative to, during the last Twenty Years.
315. Royal Naval Reserve—Returns relating to.
316. Ship Surgeons—Return respecting.

Navy—

318. Sea Fisheries Act (1868)—Orders for Fishery Grants, 1876—Report by the Board of Trade.
321. Admiralty Courts (Cork and Belfast)—Paper relating to.
340. Ship "Mary"—Correspondence relating to.
344. Captain Sullivan—Correspondence relative to the Removal of.
345. Oyster Fisheries—Report from the Select Committee (*with Plans*).
347. Tonnage at Ports in Ireland—Return of, 1862 to 1865, and 1872 to 1875.
350. Captain Sullivan—Return, in continuation of No. 344.
374. Merchant Ships detained for Unseaworthiness—Return respecting.
375. Training Ships—Return relative to.
376. Health—Statistical Report for 1875.
378. Mercantile Marine (Steam Ships)—Report on the Bursting, by Hy-

Navy—

- draulic Pressure, of a Boiler and Superheater taken out of the "Ban Righ" (*with a Plan*).
381. Naval Prize Money, &c.—Accounts for, 1875-6.
382. Seamen's Savings Banks and Money Orders—Accounts relative to.
395. Greenwich Hospital—Accounts for 1875-6.
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- CHARTS, &c., published by the Hydro-**
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 111. England, east coast: Farn Islands
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 2507. Scotland, west coast:—Ardna-
 murchan Point to Loch Bhreatail,
 Skye; including the small isles
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2138. Baltic:—Approaches to Grön
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SECTION 5.

170. Sicily, north coast, sheet I. : — Cefalù to Mazara.

SECTION 7.

290. Newfoundland :—Placentia to Burin Harbour.
375. Labrador :— Sandwich Bay to Nain.

SECTION 8.

2485. Barbadoes, with views.
456. Jamaica, south coast :—Port Royal and Kingston Harbours, with views.
525. Florida Reefs :—Boca Grande cay to Tortugas cays, with plan of Tortugas Harbour.
761. West India Islands and Caribbean Sea, sheet I. :— Florida Strait, Bahama Islands and the Greater Antilles.
697. Dominica, with view.
791. St. Vincent, with view.
762. West India Islands and Caribbean Sea, sheet II. :—from Lesser Antilles and Coasts of Venezuela and New Granada, and Gulf of Paria to Gulf of Darien.

SECTION 9.

1290. South America, east coast :— Nuevo Gulf, with Plans of Port Madrin and Cracker Bay.

SECTION 10.

15. South America, west coast :— Molyneux Sound, Concepcion Channel.
2324. Cape San Lucas to San Diego Bay, including the Gulf of California.
2323. Manzanilla Bay to the Gulf of California, including the Revilla Gigedo Islands.

SECTION 11.

638. Africa, west coast :—Congo River and adjacent Creeks.
662. Ditto, east coast :—Kilwa Point to Zanzibar Channel.
715. Indian Ocean :—Rodriguez Island and plans of Mathurin Bay and Port South-east, with views.
164. Red Sea :—Mussawwa' Channel, Africa.
658. Africa, east coast :—Rás Pekawi to Cape Delgado.

SECTION 12.

824. Bay of Bengal, east coast, sheet IV. :—White Point to Mergui.
2404. Singapore Main Strait.
819. Ceylon :—Approaches to Point de Galle Harbour, including the Gindurah and Bellows Rocks.

SECTION 13.

951. Japan :—Kii Channel to Owai Bay, with plans of Kada, Taize Ura, and adjacent Bays, south coast of Nipon.
1255. China, north-east coast :—Kyau-chau Bay to Miau-tau Strait, Shantung Promontory.
2347. Japan :— Nipon, Kiusiu, and Sikok, and part of the Korea.

SECTION 14.

1058. Western Australia :— Rottnest Island to Warnbro Sound, showing approaches to Gage Road, &c.
1063. Australia, south coast :— Bass Strait, western approach to, with views.

SECTION 15.

769. Pacific Ocean :—Admiralty and Hermit Islands, with view; and Challenger Cove, Humboldt Bay, New Guinea.
1386. Easter Island, or Rapa Nui, and plans of Cook Bay; and Sala y Gomez, with views.
786. Pacific Ocean, eastern part :— Cape Horn to Cape Corrientes.
1757. Fiji Islands :—Nukalau Island to Namuka Island, including Lau-thala Suava and Namuka Bays.

SECTION 16.

- China Sea Directory, Vol. I., Supplement.
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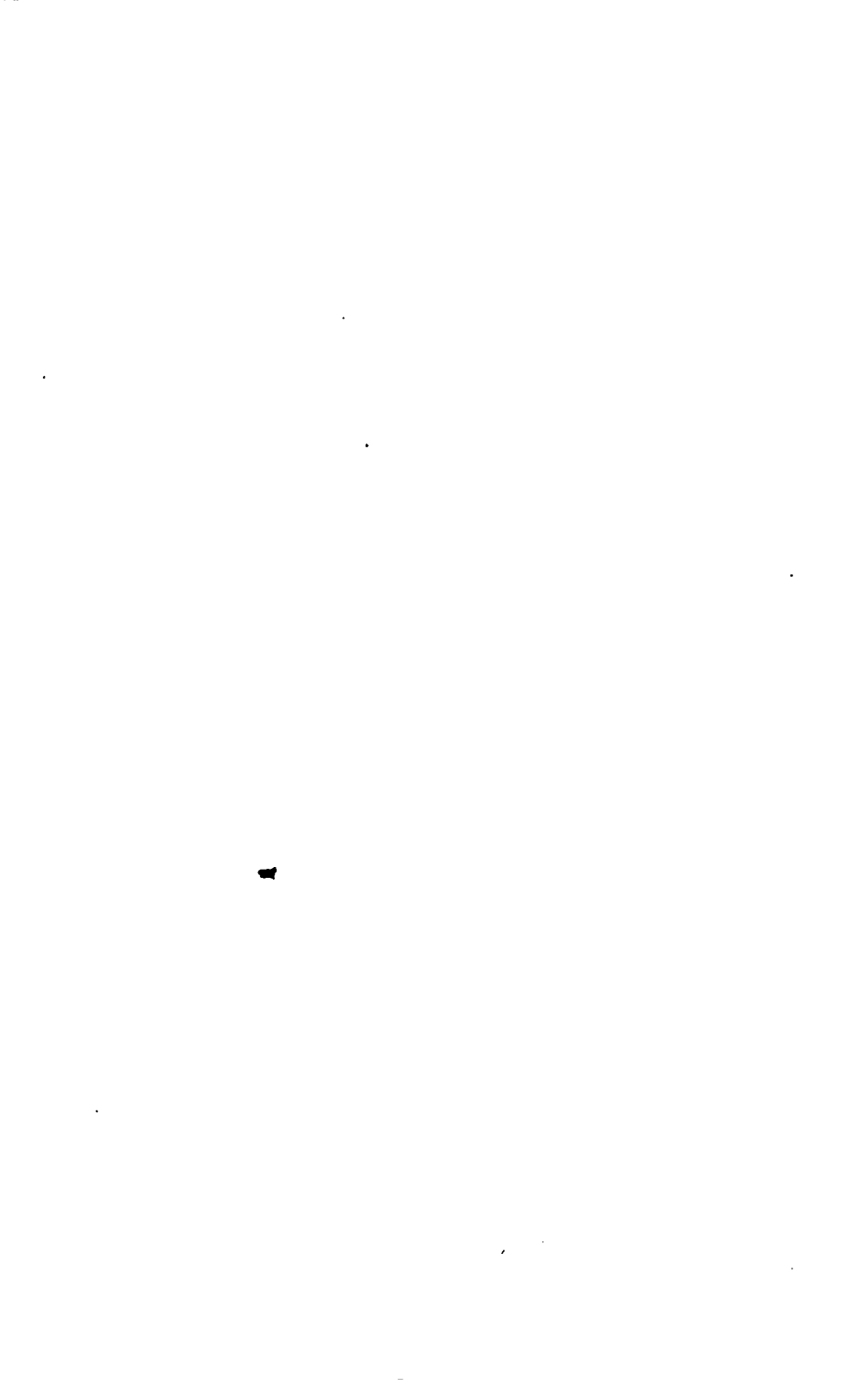
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CORRECTED TO THE
15TH MARCH, 1877.

*Should there be any error or omission in this List, it is particularly
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 *Birch, W. B. Capt. B. S. Corps
 Braham, A. H. Capt. 60th Rifles (11.)
 Bird, Edward J. Adm. (11.)
 Bird, J. W., Capt. 1st Surrey Art. Vol. (11.)
 Bird, S. G. Capt. Victoria R.V. (11.)
 Birbeck, Robt. S. Capt. 6th W.Y. Mil. (11.)
 Birby, R. K. Major 19th Lanc. Art. V. (11.)
 Bishop, H. P. Lt.-Col. R.A. (11.)
 Black, Wilsons Major 24th Regt. (11.)
 Blackett, C.E. Col. late Cold. Guards (11.)
 Blackett, Chas. F. Capt. Rifle Brig. (11.)
 Blackett, E. U. Lieut. R.A. (11.)
 Blackett, E. W. Lt.-Col.
 Blackett, H. W. R. Capt. 19th Huss. (11.)
 Blackett, R. S. late Cornet 6th Dr. Gds. (11.)
 Blake, A. M. Lieut. Gren. Gds. (11.)
 Blake, G. F. Capt. R. M. L. I. (11.)
 Blaney, W. A. F. Capt. late 52nd L. I. (11.)
 Blair, James Fox Major (11.)
 Blair-Gilbert Gordon Capt. late S.F. Gds. (11.)
 Blair, Sir Seymour J., Bart., CB. Col. late
 Rifle Brig. (11.)
 Blair, C. W. Lord Lieut. (ret.) Gren. Gds.
- *Blewitt, Charles Lt.-Col. 65th Regt. (11.)
 Blockley, John Capt. late H. A. C. (11.)
 Blomfield, R. M. Capt. R.N. (11.)
 Blomfield, Thos. E. Lt.-Col. late 26th
 Regt. (11.)
 Blood, Bindon Capt. R.E. (11.)
 Bloomfield, Sir John, GCB. Gen. Col.
 Comm. R.A. (11.)
 Blowers, W. H. Lt.-Col. Bomb. S. C. (11.)
 Bloxam, Geo. W. Capt. 3rd Carm. R. V. (11.)
 Blundell-Hollinshead-Blundell, Richard
 Lieut.-Col. 3rd Huss. (11.)
 Blythe, J. D. Capt. Paym. (h.p.) 45th Regt.
 Boileau, C. H. Capt. 61st Regt. (11.)
 Boileau, G. W. Lt.-Col. 1st City of Nor-
 wich Vols. (11.)
 Boileau, J. T. Maj.-Gen. R.E. FRS. (11.)
 Boileau, W. S. Capt. (h.p.) R.E. (11.)
 Boland, R. S. Capt. late 59th Regt.
 Boldero, G. N. Col. late Depôt Bat.
 Bolitho, E. A. Lieut. R.N. (11.)
 *Bolton, F. J. Major late 12th Regt. (11.)
 Bomford, S. Major Gloucester Mil. (11.)
 Bonney, F., MD., MRCP. Dub., MRCS. Eng.
 Asst.-Surg. 1st Royal Surrey Mil. (11.)
 Booth, J. G. Capt. R.E. (11.)
 Borough, Sir Edw., Bart. Dep.-Lieut.
 Borthwick, Alex. Capt. Rifle Brig. (11.)
 Borton A. C. Lieut. 13th Regt. (11.)
 Borton, A. J. Capt. 69th Regt. (11.)
 *Bosanquet, G. S. Capt. R. N. (11.)
 Boscawen, Hon. E. E. T. Capt. Cold. Gds. (11.)
 Bostock, J. A., CB. Dep. Surg.-Gen. (11.)
 Boswell, Geo. L. H. Capt. Gren. Gds.
 Boteler, J. H. Capt. R.N.
 Boulderson, S. S. Col. Ben. S. Corps (11.)
 Bouchier, Claude T., *W.C.* Colonel late
 Rifle Brigade, *ADC. to the Queen*.
 Bousfield, Henry Surg. (ret.) Beng. Army
 Bouverie, H. H. P. Lieut. W. Somerset
 Yeo. (11.)
 Bowden, H. G. Major (ret.) 22nd Regt. (11.)
 Bowdich, E. H. S. M.-Gen. Bomb. Army
 (11.)
 Bower, G. J. Lieut. R.N. (11.)
 Bower, J. Lt.-Col. Hants Mounted R.V. (11.)
 Bowers, Henry Dep. Com.-General
 Bowles, A. M. Lieut. 95th Regt. (11.)
 Bowles, H. C. Lieut. Rifle Brigade (11.)
 Bowles, R. F. Capt. late R. Berks Mil. (11.)
 Bowly, J. D. Capt. R.E. (11.)
 Bowmen, H. S. Major (ret.) 35th Regt.
 Bowyer, E. A. Capt. late 1st W. I. Regt.
 Boxer, C. R. F. Capt. R.N. (11.)
 Boxer, E. M. Major-Gen. (ret.) R. A. (11.)
 Boyce, E. J. G. Lieut. R.E. (11.)
 Boycott, Wm. Major late 29th Regt. (11.)
 Boyd, Jas. P. Capt. late Roy. Can. R. (11.)
 Boyle, Alex. Rear-Adm. (11.)
 Boyle, E. R. Capt. (ret.) Cold. Gds. (11.)
 Boyle, Gerald E. Lieut. Rifle Brig. (11.)
 Boyle, Patrick D. Capt. Gr. Gds. (11.)
 Boyle, R. H. Capt. R.N. (11.)
 Boyle, Hon. W. G. Lt.-Col. 2nd Somerset
 Militia, late Lt.-Col. Cold. Gds.
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Brackenbury, C. B. Lt.-Col. R.A. (11.)
Brackenbury, Henry Lt.-Col. R.A. (11.)
Brackenbury, H. Maj. late Depôt Batt. (11.)
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Bradley J. D. Capt. late 14th Regt. (11.)
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Bradshaw, R. A. Capt. R.N. (11.)
Brady, Maziere K. Lieut. R.E. (11.)
Brain, D. List Lieut. 4th King's Own (11.)
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Branding, Charles Lieut. late Gr. Gds.
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Browne, J. F. M., CB. Col. R.E. (11.)
Browne, W. B. Capt. 46th Regt. (11.)
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Burnand, N. Lieut.-Col. late Cold. Gds.
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 Lancers (11.)
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 Byng, Geo. P. F. Capt. 105th Reg. (11.)
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 Byrne, T. E. Lieut.-Col. R.A. (11.)
 Byrne, Tyrell M. Lt.-Col. late 1st Royals
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 Cadell, R. CB. Colonel R.A. (11.)
 Cadell, Thos., *S. C.* Major Beng. S. C. (11.)
 Cadogan, Hon. Sir Geo., KCB. Lt.-Gen.
 (11.)
 *Cafe, Haydon L. Lt.-Col. late 94th Regt. (11.)
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 Caldbeck, Wm. Lt. late Limerick Mil. (11.)
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 Caldwell, R. Maj. 1st Warwick R. V. (11.)
 Caldwell, W. B. Lt.-Col. late 76th Regt. (11.)
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 42nd Royal Highlanders (11.)
 Cameron, J., CB. Maj.-Gen. R.E. (11.)
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 *Cameron, W. Gordon, CB. Col. 4th Regt. (11.)
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 late Lieut.-Col. Soc. Fus. Gds. (11.)
 Campbell, A. H. Lt.-Col. late B. S. C. (11.)
 Campbell, Duncan Lieut.-Col.
 Campbell, F. Lorn Capt. S. F. Gds. (11.)
 Campbell, George, CB. Gen. R.A. (11.)
 Campbell, Sir Geo., *Bart.* Capt. late 1st Drs.
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 Campbell, Hon. R. G. E. Capt. Cold. Gds. (11.)
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 Campbell, W. F., Lord Maj. 46th Mid.
 R.V. (11.)
 Campbell, W. M. Capt. R.E. (11.)
 Campbell, Walter S. late Lieut. Rifle Brig. (11.)
 Campbell, W. M. T. Major R.E. (11.)
 Campbell, W. P. Lt. 60th Rl. Rifles (11.)
 Cannon, R. Lieut.-Gen. (11.)
 Carden, G. Lt.-Col. 5th Fus. (11.)
 Carden, F. W. Lieut.-Col. (11.)
 Cardew, Fred. Capt. 82nd Regt. (11.)
 Cardwell, Reginald Capt. 1st Lanc. Mil. (11.)
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 Carrill, Sidney Capt. 55th Regt. (11.)
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 Gds. MP. (11.)
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 Carpenter, G. W. W. Major (11.)
 Carr, Fredk. S. Capt. 5th Punjab Cav. (11.)
 Carrick, S. A. EARL of Capt. late Gr. Gds.
 Carrington, Chas. W. Major R.M.L.I. (11.)
 Carrington, Fred. Lieut. 24th Reg. (11.)
 Carson, Jas. S. Capt. Rl. Bucks Mil. (11.)
 Carter, H. Bonham. Lt.-Col. late Cold. Gds.
 (11.)
 Carter, Jno. M. Lieut.-Col. late Adj. Roy.
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 Carter, Robt. Brudenell, FRCS. late
 Staff Surgeon, A.M.D. (11.)
 Cartwright, H. Col. late Gr. Gds. MP. (21.)
 Case, John Navy Agent (11.)
 Cass, A. H. Lieut.-Col. 10th Huss. (11.)
 Casson, B. T. Capt. 5th W. York Mil. (11.)
 Castle, W. McCoy Fitzgerald Lieut. R.N. (11.)
 *Caulfield, J. A. Major Royal Tyrone Fus.
 late Capt. Cold. Gds.
 Cautley, George Major-Gen. (unatt.) (11.)
 Cautley, Henry Capt. R.E. (11.)
 Cavaye, C. W. Lieut. 24th Reg. (11.)
 Cavenagh, Orfeur Lieut.-Gen. (11.)
 Cavenagh, Gordon M.-Gen. Beng. S. C. (11.)
 Cavendish, Hon. C. C. W. Lt. 10th Huss. (11.)
 Cavendish, Jas. Chas. Capt. (ret.) R.A. (11.)
 *Cavendish, W. H. F. Lieut.-Col. Comm't.
 2nd Derby Rifles, late 52nd L.I.
 Cawkwell, W. Lieut.-Col. Eng. Railway Vol.
 Staff Corps (11.)
 Cawston, Geo. late Lt. 1st Mid. Art. Vols. (11.)
 Cecil, Eustace, Lord Lt.-Col. MP. (11.)
 Chads, Henry Vice-Adm. (11.)
 Chadwick, Edw. Lieut. 16th Lancers (11.)
 *Chalmer, R. Capt. 60th Rifles (11.)
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 Chambers, Edw. Lt. London Art. Vols. (11.)
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 Stafford Mil. (11.)
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 *Chapman, W. E. Capt. (h.p.) 1st Dr. Gds. (11.)
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 Chichester, H. A. Capt. 25th Regt. (11.)
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 Chinn, Edw. Capt. late 12th Regt. (11.)
 Chisholm, A. B. Capt. late 25th (11.)
 Cholmeley, H. J. Capt. 16th Regt. (1)

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 Churchill, LORD Edw. Spencer Lt. Isle of
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 Clive, E. H. Col. Gr. Gds. (11.)
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 19th Regt. (11.)
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 Yeo. Lieut. (ret.) 1st Life Gds.
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 Clowes, G. G. Major late 8th Hussars
 Clutton, Owen Maj. late 7th Surrey R.V. (11.)
 Cochran, Francis Capt. 37th Regt. (11.)
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 land Mil. (11.)
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 (11.)
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 Codrington Alfred E. Lieut. Cold. Gds. (11.)
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 Codrington, Sir W. J., GCB. Gen. Col.
 Cold. Gds. (21.)
 Codrington, W. Wyndham Lt. late 17th Lanc.
 Coe, E. O. Lt. late Edmonton R. Rifles (11.)
 Cohen, Lionel B. Capt. Tower Hamlets
 Engr. Vols. (11.)
 Coke, Hon. E. K. W. Capt. late Cold. Gds.
 Coke, Thos. W. VISCOUNT Capt. Scots Fus.
 Gds. (11.)
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 Coker, E. Rogers Capt. 106th Reg. (11.)
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 Coleman, W. F. G. Capt. late R. Drag. (11.)
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 Coles, Chas. H. Capt. 1st Surrey Art. Vols.
 (11.)
 *Collen, E. H. H. Capt. Bengal Staff Corps
 Colleton, Sir R. A. W., Bt. Lt. 23rd Regt. (11.)
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 Collings, G. M. Capt. R.E. (11.)
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 Collins, F. MD. Surg.-Maj. A.M.D. (11.)
 Collins, Wm. Louis Capt. 1st Exeter R.V. (11.)
 Collinson, Sir Richard, KCB. Adm. (11.)
 *Collinson, T. B. Maj.-Gen. R.E. (11.)
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 *Colomb, J. R. C. Capt. late R.M.A. (11.)
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 Colquhoun, J. A. S. Capt. R.A. (11.)
 Colthurst, James N. Major 6th Regt. (11.)
 *Colville, Charles F. Capt. 11th Regt. (11.)
 Colville, Henry E. Capt. Gren. Gds. (11.)
 Colvill, Hugh G. Capt. late 29th Regt. (11.)
 Colville, Hon. W. J. Col. late R. Brig. (11.)
 Colvin, W. B. Major 7th Roy. Fus. (11.)
 *Comber, H. W. Capt. R.N.
 Combermere, Wellington H. S. VISCOUNT
 Col. (11.)
 Commerell, Sir J. E., & C. KCB. Rear-Adml.
 (11.)
 Comerford, Jas. W. Capt. 22nd Mid. R.V. (11.)
 Compton, A. F. Lieut. Gren. Gds. (11.)
 Coney, Bicknell Major late 17th Lancers
 Conolly, Arthur Capt. Bengal S. Corps (11.)
 Conolly, Jas., CB. Maj.-Gen.
 Conolly, J. A., & C. Lieut.-Col. (ret.)
 Coldm. Gds. (11.)
 Conway, T. S., CB. Maj.-Gen. (11.)
 Cook, Henry Lieut.-Col. 100th Regt. (11.)
 Cooke, A. C., CB. Col. R.E. (11.)
 Cooke, T. C. Capt. R.A. (11.)
 Cookeley, E. M. Capt. late 22nd Regt. (11.)
 Cooper, Edw. H. Lt.-Col. (ret.) Gren. Gds.
 MP.
 Cooper, Harry Lieut. 47th Regt. (11.)
 Cooper, Wm. Col. late 19th Regt. (11.)
 Cooper, W. Cooper Maj. late Bedford Mil. (11.)
 Cooper, Wm. Lt. late 4th Midx. R.V. (11.)
 Cope, Edwd. Lieut. Robin Hood R.V. (11.)
 Cope Richd. Capt. late 7th R. Lancashire
 Mil. (11.)
 Cope, Sir W. H., Bart. Lieut. late Rifle
 Brig. (11.)
 Copeman, C. B. Capt. 1st Lanc. R. V. (11.)

Coppinger, T. S.	Lieut. 11th Regt. (11.)	Crohan, Herbert	Comr. R.N. (11.)
Corbally, James A.	Capt. 103rd Regt. (11.)	Crokat, Chas. F..	War Office (11.)
Corbett, W. A.	Capt. late 62nd Regt. (11.)	Croker, Wm.	Major (ret.) 27th Regt. (11.)
Corkran, C. S.	Lt.-Col. Gren. Gds. (11. 1s.)	Croker-King, C. E.	Capt. 78th Highlrs. (11.)
Cornish, Chas. O.	Capt. 73rd Regt. (11.)	Crombie, T.	Lieut.-Gen.
Cory, Arthur	Col. Bengal S. Corps (11.)	Crommelin, W. A.	M.-Genl. R.E. (11.)
Corry, Hon. Hen. W. L.	Capt. Cold. Gds. (11.)	Crookshank, Alex. Crowder, CB.	Dep. Com.-Gen. (11.)
Corscaden, John F.	Capt. late Queen's West. R.V. (11.)	Crookshank, Arthur	Capt. Ben. S.O. (11.)
Cosby, T. P.	Major 14th Regt.	Crosse, Joshua G.	Major (ret.) 62nd Regt. (11.)
Costello, T. M.	Surgeon R.N. (11.)	Crossley, L. J.	Capt. 8th W.Y. Art. V. (11.)
Costin, C.	Capt. late 14th Regt. (11.)	*Crossman, William, CMG.	Lieut.-Col. R.E. (11.)
Cotes, Charles James	Capt. Gren. Gds.	Crowe, S. M.	Capt. late Kent Art. Mil.
Cotton, A. McClintock	Lieut.-Col. 20th Hussars (11.)	Crozier, H. E.	Capt. R.N. (11.)
Cotton, Corbet	Lt.-Gen.	Crozier, Richard	Adm. (11.)
Cotton, Thos. F.	Staff Surgeon (h.p.)	Cruikshank, A. R.	Capt. R.A.
Coulson, J. B. B.	Capt. (ret.) Rifle Brig.	*Cuffe, O. W.	Capt. (h.p.) R. M. A.
Courtenay, E. Jas.	Lieut. 35th Regt. (11.)	Adj. Waterford Art. Mil. (11.)	
Courtney, D. C.	Lieut. R.E. (11.)	Cumberland, C. E.	Col. R.E. (11.)
Coventry, H. A. F. F.	Lt. late 60th Rifles (11.)	Cumberlege, H. O.	Capt. Ben. S. C. (11.)
Cowan, Phineas	Lt.-Col. 3rd London R.V. (11.)	*Cumming, W. H.	Capt. R.N. (11.)
Cowell, Sir J. C., KCB.	Lieut.-Col. R.E.	Cumming, Wm. Capt. (ret.)	48th Regt. (11.)
Cowper, H. Capt. late King's German Legion		Cundell, J. P.	Lieut. R.A. (11.)
Cox, Francis Edward	Lieut.-Col. R.E.	Cunninghame, Sir W. J. M., Bart., &c.	Major (11.)
Cox, H. J. W.	Capt. 9th Kent Art. Vols. (11.)	Cunningham, J. W. H.	Capt. late 2nd Life Gds.
Cox, James Ponsonby	Lt.-Col. R.E. (11.)	Cunningham, John D.	Lieut. R.A. (11.)
Cox, E. Sneyd	Major Hereford Mil.	Cunynghame, Henry H.	Lieut. late R.E. (11.)
Cox, Talbot A.	Col. 3rd Buffs (11.)	Cuppige, Sir Burke, KCB.	Lt.-Gen. Col. Comt. R.A.
Crabbe, Eyre M. S.	Lt. Gren. Gds. (11.)	Cureton, E. B.	Col. (11.)
Craigie, Patrick G.	Capt. Roy. Perth Rifles (11.)	Curme, C. T.	Capt. R.N. (11.)
Craster, G. A.	Lieut.-Col. R.E. (11.)	Currie, A. D.	Capt. 41st Regt. (11.)
Craufurd, H. R. G.	Lieut. late R.A. (11.)	Currie, James P.	Maj. Civil Ser. Vols. (11.)
Craufurd, J. R.	Gen. Col. 91st Regt. (11.)	Curteis, Edwd. W.	Lieut. 24th Regt. (11.)
Craven, Geo. EARL of	Capt. Warwick Yeo. (11.)	Curtis, A. C.	Capt. R.N. (11.)
Craven, Wm. George	Lieut. Gloucestershire Yeo. late Lt. 1st Life Gds.	Curtis, James D.	Comr. R.N. (11.)
Crawford, Geo. A.	Maj. 4th R. Lanc. Mil. (11.)	Curtis, Reginald	Col. R.A. (11.)
Crawford, Thos., MD.	Surgeon-Gen. (11.)	*Curtis, Seymour	Capt. R.N. (11.)
Crawford, C. W. F.	Lieut. R.N. (11.)	Curzon, Hon. E. G.	Col. 52nd L. I.
Crawford, H. J.	Lieut. Gren. Gds. (11.)	Curzon, Hon. Montague	Lt. Rifle Brig. (11.)
Crawford, H. P. R. F.	Maj. Mad. S.O. (11.)	Cust, Henry Francis	Capt. North Salop Yeo. MP.
Crawley, T. G.	Capt. 8th or King's	Cust, John Francis	Lt.-Col. late Gr. Gds.
Crawley, T. R.	Col. (11.)	Custance, F. H.	Lt.-Col. late Gren. Gds. (11.)
Creagh, John	Major 5th Fus. (11.)	Cutler, Fredk.	Sub-Lt. late 1st W.I. Regt. (11.)
Crealock, H. Hope, CB.	Col. Unatt. (11.)		
Creed, Henry	late Lt.-Col. 1st Middl. Art. Vols. late Capt. Bombay Army (11.)	DAGRES, Sir R. J., GCB.	Gen. Col. Comt. R.A. (11.)
Creek, Edwd. Stanley	Capt. 23rd R. W. Fus. (11.)	Dale, Chas. L.	Lieut. 2nd W. I. Regt. (11.)
Cremorne, Vesey LORD, MP.	Lt.-Col. late Coldm. Gds. (11.)	Dalison, M. D. D.	Lt. S. F. Gds. (11.)
Cree, Thomas	Comr. R.N. (11.)	Dallas, R. C. F.	Lieut. late 98th Regt. (11.)
Creyke, A. S.	Capt. R.E.	Dalrymple, Sir H., Bart.	Lt.-Col.
Creyk, William, MB.	Surg.-Maj. R.A. (11.)	Dalrymple, J. H. E.	Lieut.-Gen. (11.)
Crichton, Hon. C. F.	Lieut.-Col. late Gr. Gds. (11.)	Dalrymple, Hon. North de C.	Lieut. S. F. Gds. (11.)
Crichton, D. M. M.	Lt.-Col. Gren. Gds. (11.)	Dalrymple, W. R. E.	Lieut. Rl. Ayr and Wigtown Mil. (11.)
Crichton, Hon. Hen. G. L.	Capt. 21st Huss. (11.)	D'Aguilar, Chas. L., CB.	Maj.-Gen. R.A. (11.)
*Crofton, Stephen S. L.	Rear-Adm.	Dalton, C. J.	Maj.-Gen. R.A. (11.)
Croghan, J. W.	Lt.-Gen. Col. Comt. R.A. (11.)	Damer, S. L. Dawson	Capt. late S. F. Gds. MP. (11.)
		Dames, T. L.	Capt. late R.A. ()

- Dangan, Lord Lt.-Col. (ret.) Cold. Gds. (11.)
 Daniel, E. H. Lt.-Col. 18th R. Irish (11.)
 Daniell, C. F. T. Lt.-Col. late 28th Regt. (11.)
 Darley, W. S. Lieut. 5th Fusiliers
 Darling, Sydney Lieut.-Col. (11.)
 *Dartmouth, EARL of Capt. Staf. R.V. (11.)
 Darwin, S. C. Lieut. R.N. (11.)
 Dashwood, G. J. E. Capt. late S. F. Gds. (11.)
 *Daubeny, A. G. Major 7th Fusiliers (11.)
 Daubeny, E. Capt. (ret.) 58th Reg. (11.)
 Daubeny, James, CB. Maj.-Gen.
 Daubeny, J. F. Capt. late 18th Roy. Irish (11.)
 Daubeny, W. A. Major late 3rd Buffs (11.)
 Daunt, Arthur H. Lieut. 7th Royal Fus. (11.)
 Daunt, John C. C., &c. Capt. Beng. S.O. (11.)
 Davidson, C. R. T. Capt. R.E. (11.)
 *Davidson, D. Lt.-Col. City of Edin. R. Vols., (ret.) Bom. Army (11.)
 Davis, Sir H. R. Ferguson, Bart. Gen. Col. 78rd Regt. MP. (11.)
 *Davies, Geo. S. Major (11.)
 Davies, Henry F. Lt.-Col. Gren. Gds. (11.)
 Davis, Hugh Comr. R.N. (11.)
 *Davis, John Capt. 2nd Surrey Mil. (11.)
 Dawes, Thomas Capt. Ben. S.G. (11.)
 Dawson, D. F. R. Lieut. Cold. Gds. (11.)
 Dawson, Hon. E. S. Comr. R.N. (11.)
 Dawson, John B. Capt. Haddington Mil. Art. (11.)
 Dawson-Scott, R. N. Major R.E. (11.)
 Dawson, Vesey John Lt. Cold. Gds. (11.)
 Deane, B. M. Lt.-Col. 19th Regt. (11.)
 Deane, H. B. Capt. Inns of Court R.V. (11.)
 De Bathe, Sir H. P., Bart. Lt.-Gen. (11.)
 *De Butts, J. O. B. Col. R.E. (11.)
 Deering, Chas. L. H. Capt. Dublin Mil. Lt. late 28th Regt. (11.)
 *De Fonblanque, E. B. ret. Controller (11.)
 *Degacher, H. J. Major 24th Regt. (11.)
 *De Horsey, A. F. R. Rear-Adm. (11.)
 De Horsey, W. H. Beaumont Col. Gr. Gds. (11.)
 De Kantzow, Herbert P. Capt. R.N. (11.)
 De la Poer, R. H. Lt. late 15th Regt. (11.)
 De la Voye, Alex. M. Lieut. 56th Regt. (11.)
 De Moleyns, T. A. Major R.A. (11.)
 Denison, Henry Lieut. R.E. (11.)
 Denny, Cuthbert C. Lieut. late 17th Regt. (11.)
 Dent, Herbert W. 2nd Queen's Rl. (11.)
 *De Robeck, Hastings St. J. Comr. R.N. (11.)
 De Satge-de Thoren, O. W. Capt. late 38th Regt. (11.)
 De Salis, Rodolph, CB. Maj.-Gen. (11.)
 De Schmid, H. W. F., Capt., South Devon Mil. (11.)
 *Desborough, John, CB. Col. R.A. (11.)
 De Teissier, The BARON. Col. Unatt. (11.)
 De Vesce, J. R. W. Viscount Lieut.-Col. Cold. Gds. (11.)
 Dewar, J. R. J. Major R.A. (11.)
 De Winton, F. W. Major R.A. (11.)
 De Winton, Walter Capt. late 1st L. Gds. (11.)
 D'Kye, W. B. Capt. (ret.) 92nd Regt. (11.)
 Dick, Wm., MD. D.-I.-G. Hospa. (11.)
 Dickens, C. H., CSI. Col. R.A. (11.)
 Dickens, C.S.S. Capt. late R. Sussex L. I. Mil.
 Dickinson, J. D. late Lieut. 24th Regt. (11.)
 Digby, the Hon. E. C. Capt. Gren. Gds. (11.)
 Digweed, W. H. Lt.-Col. late Hants. Mil. (11.)
 Dillon, Hon. Arthur Dep.-Lieut. Co. Mayo (11.)
 Dillon, H. A. Capt. Oxf. Mil., late Lieut. Rifle Brig. (11.)
 *Dillon, Martin, CB. CSI. Col. Rifle Brig. *ADC. to the Queen* (11.)
 Dillon, R. H. Capt. 45th Regt. (11.)
 Disney, E. J. Capt. Essex Rifles, late 7th Fus. (11.)
 Dixon, Manley C. M. Capt. 8th or King's (11.)
 Dixon, Walter C. Lt. 10th Surrey R.V. (11.)
 Dixon, Wm. Manly Hall, CB. Maj.-Gen. (11.)
 Dobbs, F. G. Lt. 1st Midx. Art. V. (11.)
 Dobson, G. Adm. (11.)
 Docker, E. S. D.-I.-G. of Hospitals
 Doherty, Chas. W. O. Lieut. 2nd Royal N.B. Dragoons (11.)
 Doherty-Waterhouse, D. H. Capt. (ret.) 3rd Huss. (11.)
 Dolby, J. E. A. Capt. late N. Y. Rifles (11.)
 Domville, Sir Charles C. W., Bart. Col. late Dublin Co. L. I. Militia (11.)
 Domville, W. Major, late 21st R. N. B. Fus., (ret.) Worcester Militia (11.)
 Domville, J. W. M.-Genl. R.A. (11.)
 Doncaster, J. B. Capt. 73rd Regt. (11.)
 *Dooley, M., Maj. late Paym. 1st W.I. Regt.
 Dorchester, Lord Col. late Cold. Gds.
 Dorling, Francis Lieut. 96th Regt. (11.)
 Dormer, Lord Capt. late 74th Highlrs., (11.)
 Dorville, John W. Capt. R.N. (11.)
 Douglas, George M. Capt. 33rd Regt. (11.)
 Douglas, Sir John, KCB. Lt.-Gen.
 Douglas, Sir Rob. Percy, Bart. Gen. Col. 96th Regt. (11.)
 Douglas, Sholto Capt. R.N. (11.)
 Dowding, Herbert W. Lieut. R.N. (11.)
 Dowson, C. S. Lt.-Col. late 10th Regt. (11.)
 Doyle, Sir O. Hastings, KCMG., Major-Gen. Col. 87th Regt. (11.)
 Doyle, Francis G. Capt. 2nd Dr. Gds. (11.)
 Drake, F. G. A. Capt. late R. H. Gds.
 *Drake, J. Mervin C. Major R.E. (11.)
 Drake, Thomas George Capt. R.N.
 Draper, Edward T. Navy Agent (11.)
 Drayson, Alfred Wilkes Col. R.A.
 Drew, Andrew Adm. (11.)
 Drew, F. B. Lt.-Col. 8th or King's (11.)
 Druitt, Percy S. Lieut. 101st Regt. (11.)
 Drummond, Archd. S. Lt. S. F. Gds. (11.)
 Drummond, A. H. Capt. Rifle Brig. (11.)
 Drummond, Edgar A. Lt. R.N. (11.)
 Drummond, John Capt. late 10th Huss. (11.)
 Drury, Byron Rear-Adm.
 Du Cane, E. F., CB. Lt.-Col. R.E. (11.)
 Du Cane, F. Major (ret.) R.E. (11.)
 Ducie, EARL of Lord Lieut. Gloucester (11.)
 Ducket, W. M. Lieut. 21st R.N.B. Fus. (11.)
 Duff, A. M. Capt. (ret.) 74th Highlrs. (11.)
 Duff, James Maj. late 23rd R. W. Fus. (11.)

Duff, R. W.	Major R.E. (11.)	Elliot, John	Col. R.M.L.I. (11.)
Dugdale, A. G.	Lieut. R.A. (11.)	Elliot, W. H.	Major-Gen. late R.A. (11.)
Dunbar, W. M.	Major 24th Regt.	Elliot, Wm.	Capt. 4th E.Y. Art. V. (11.)
Duncan, A. W.	Major R.A. (11.)	Ellis, C. H. Fairfax	Capt. R.A. (11.)
Duncan, Fras.	Major R.A. (11.)	Ellis, Fred.	Capt. late 9th Lancers (11.)
Duncan, John	Capt. 102nd Regt. (11.)	Ellis, William	Rear-Adm. (11.)
*Duncan, P.	Capt. W. Cork Art. Mil. (11.)	Ellis, W. B. E.	Major R.A.
Duncombe, Hon. A.	Adm. (11.)	Ellison, E. G.	Maj. (ret.) 9th Lancers (11.)
Duncombe, Hon. Cecil	Capt. late 1st L. Gds.	Elliston, E. C.	Capt. B.S.C. (11.)
Duncombe, C. W.	Capt. 1st Life Gds.	Elmsall, W. de C.	Major late R. Drs. (11.)
Duncombe, George T.	Capt. late 16th Regt.	Elphinstone, John	Col. Madras S. C. (11.)
Dundas, James D.	Major 60th Roy. R. (11.)	Elrington, F. B., CB.	Maj.-Gen. late Rifle Brig. (11.)
Dundas, Thomas	Maj. (ret.) 12th Regt. (11.)	Elrington, W. F.	Lt.-Col. late Sco. Fus. Gds. (11.)
Dunlop, Franklin, OB.	Lieut.-Gen. R.A.	Elsdale, H.	Lieut. R.E. (11.)
*Dunne, J. H.	Col. 99th Regt. (11.)	Elwes, W. C. C.	Capt. (ret.) 71st H. L. I. (11.)
Dunne, T. J. B.	Lieut. 2nd Queen's Royal Regt. (11.)	Elwyn, Thomas	Lt.-Gen. R.A. (11.)
Dunsany, Right Hon. Edw. Lord	Vice-Adm. (11.)	Elyard, J.	Major 2nd Rl. Sur. Mil. (11.)
Durham, P. F.	Capt. late 37th Regt. Adj. Royal Cardigan Rifles	*Enfield, Viscount, MP.	Hon. Col. Royal Edmonton Rifle Regt.
Durie, Charles	Lieut.-Col.	England, F. Herbert	Lieut. 61st Regt. (11.)
Durnford, F. A.	Lt.-Col. Sur. Art. Vols. (11.)	England, Sir Rich., GCB. KH.	Gen. Col. 41st Regt. (11.)
Dutton, W. C.	Lieut. West. I. Regt. (11.)	Enniskillen, W. W., EARL of, FRs.	Col. Fermanagh Militia (11.)
Dwyer, L. F. W.	Capt. 106th Regt. (11.)	Errington, A. C.	Lieut.-Gen. (11.)
Dyson, Edward	Maj. late 3rd Dr. Gds. (11.)	Errington, A. J.	Comr. R.N. (11.)
*EAST, Cecil J.	Major 41st Regt. (11.)	Erskine, Geo.	Major-Gen. (11.)
Eastwick, E. B., CB.,	Lieut. late 6th Bomb. N.I. MP. (11.)	Erskine, J. Elphinstone,	Adm. (11.)
Eastwick, W. J.	Capt. (ret.) Bo. Army (11.)	Estridge, Geo.	Lt.-Col. late St. Kits Mil. (11.)
Eaton, H. F.	Capt. Gren. Gds. (11.)	Evans, E. T.	Lieut. 94th Regt. (11.)
Eden, Sir Charles, KCB.	Admiral	Evans, George	Adm. (11.)
Eden, H. H.	Capt. 30th Regt. (11.)	Evans, H. D.	Capt. R.A. (11.)
Eden, J.	Capt. late 14th Hussars	Evans, H. Lloyd	Lt.-Col. late Indian Army (11.)
Eden, M. R.	Major unatt. (11.)	Evans, John	Capt. (ret.) 6th Innis. Drs. (11.)
Eden, W. Hassall	Gen. Col. 90th L. I. (11.)	Evans, Saml. T. G.	Capt. Eton R. Vols. (11.)
Edenborough, H.	Maj. late W. Essex Mil.	Eveleigh, G. C.	Capt. (h.p.) R.A.
Edgcumbe, Hon. C. E.	Lt.-Col. late Gr. Gds. (11.)	Evelyn, C. F.	Maj. 3rd R. Sur. Mil. (11.)
Edgcumbe, Piers	Lieut. 44th Regt. (11.)	Ewart, Henry P.	Lieut.-Col. 2nd Life Gds.
Edmeades, H.	Major R.A. (11.)	Ewart, R. W.	Capt. Scot. Borders. Mil. (11.)
Edmunds, Charles	Vice-Adm.	Ewart, W. S.	Lt.-Col. (ret.) Gren. Gds. (11.)
Edridge, F. L.	Lt.-Col. 20th Regt. (11.)	Exeter, MARQUIS of	Col. Northampton Mil., ADC. to the Queen
Edwards, F. J.	Lieut. R.E. (11.)	Eyre, F. V.	Major R.A. (11.)
*Edwards, J. B.	Lieut.-Col. R.E. (11.)	Eyre, Henry	Gen. Col. 59th Regt. (11.)
Edwards, Nathaniel F.	Capt. R.N.	Eyre, Henry R.	Lt.-Col. Cold. Gds. (11.)
Egerton, Alfred M.	Capt. B. H. Gds. (11.)	Eyre, Philip H.	Major 38th Regt. (11.)
*Egerton, Hon. Francis, MP.	Rear-Adm. (11.)	Eyre, Sir Vincent, CB. KCSI.	Maj.-Gen. (11.)
Egerton, F. P.	Capt. R.N.	FABER, W. Raikes, CB.	Lt.-Gen. Col. 17th Regt.
*Egerton, F. W.	Comr. R.N. (11.)	Fagan, C. S. F.	Lieut. R.M.L.I. (11.)
Egerton, Sir P. de Malpas Grey, Bart., MP.	FRS. Lt.-Col. Cheshire Yeomanry (11.)	Fairfax, T. F.	Lt.-Col. (ret.) Gr. Gds. (11.)
Egerton, P. de B.	Capt. late Cold. Gds. (11.)	Fanshawe, Charles	M.-Genl. R.E.
Egerton, W. W.	Capt. 8th or King's (11.)	Farewell, W. T. F.	Col. Mad. S. C. (11.)
Elcho, Lord, MP.	Col. Lond. Sco. R. V. (11.)	*Farquhar, Arthur	Vice-Adm. (11.)
Elgee, C. W.	Col. R.A. (11.)	Farquhar, F. G.	Capt. 2nd B.N.B. Drs. (11.)
Elia, Alfred	Capt. Royal Edmonton Rifle Regt. (11.)	Farquharson, J. B.	Lt.-Col. (ret.) S. F. Gds.
Elia, Robert	Capt. 59th Regt. (11.)	*Farquharson, M. H.	Capt. R.M.L.I. (11.)
Eliot, Hon. C. G. C.	Capt. (ret.) Gr. Gds.	Farr, William	Lieut. R.N. (11.)
*Elles, W. K.	Major 38th Regt. (11.)	Farrell, H. C.	Major R.A. (11.)
Ellice, Sir O. H., KCB.	Lieut.-Gen. (11.)	Farrell, J. Sidney	Major (ret.) R.A.
Elliot, A. F., MD.	Staff Surgeon (11.)	Farrell, J. D. C.	Maj. 26th Kt. R. V. (11.)
Elliot, Hon. Charles G. J. B., CB.	Adm.	Farrell, Sidney B.	Lt.-Col. R.R.
Elliot, George	Admiral (11.)	Farrer, Henry	Capt. 94th Regt.

- Farrer, W. D. M. C. P. Lt. Gren. Gds. (11.)
 Farrington, H. D'O. Maj. 73rd Regt. (11.)
 *Farrington, M. C. Maj. 51st K.O.L.I. (11.)
 *Fawcett, R. H. Capt. 33rd Regt. (11.)
 Fawkes, Wilmot H. Lieut. R.N. (11.)
 Feilden, H. M., Capt. late 1st Royal
 Lanc. Mil. MP.
 Feilden, R. J. Col. late 60th Rifles (11.)
 Fellowes, Edward Col. late 11th Huss. (11.)
 Fellowes, P. H. Col. R.M.L.I. (11.)
 Fenning, S. W. Lieut.-Col. (11.)
 Fenwick, N. E. de B. Lieut. 60th Rifles (11.)
 Ferguson, G. A. Lieut.-Col. (ret.) Gren. Gds. (11.)
 Festing, Sir Francis W., CB., KCMG. Col.
 R.M.A. (11.)
 Field, Æsculapius late Hon. Corps
 Gentlemen-at-Arms
 Field, G. T. Col. R.A. (11.)
 *Field, J. W. P. Capt. H.A.C. (11.)
 Fife, Aubone G. Lieut. 5th Lancers (11.)
 Fife, J. Cookson Capt. 65th Regt. (11.)
 Filmer, Sir Edm., Bart. late Cornet Royal
 East Kent Yeo.
 Finucane, George Col.
 Firebrace, Frederick Capt. R. E. (11.)
 Fisher, A. A'Court, CB. Col. R.E. (11.)
 Fischer, J. F. Col. R.E. (11.)
 Fitzgerald, Charles C. P. Comr. R.N. (11.)
 Fitzgerald, P. S. Capt. late 2nd R. Lanc. R.
 Fitzhugh, H. T. Col. R.A. (11.)
 FitzJames, Arthur Chas. Col. Comt.
 4th R. S. Midx. Mil. late 93rd Highrs.
 Fitz-Patrick, Hon. B. E. B. Capt. Rl.
 Cork Art. Mil., late Lieut. 1st Life Gds. (11.)
 Fitzroy, A. W. M. Lieut. Cold. Gds. (11.)
 Fitzroy, Lord A. C. Lennox, CB. Maj.-
 Gen. (11.)
 Fitzroy, C. O. Maj. (ret. h.p.) 68th L.I. (11.)
 Fitzroy, Lord F. J. Lt.-Col. late Gr. Gds. (11.)
 Fitzroy, G. R. Lieut.-Col. Cold. Gds. (11.)
 Fitzroy, Philip Major 5th Fus. (11.)
 *Fitz Roy Robert O'B. Capt. R.N. (11.)
 *Fletcher, H. C., CMG. Col. Sco. Fus.
 Gds. (11.)
 Flood, H. Capt. 2nd Queen's (11.)
 Flood, J. C. H. Lieut. 19th Huss. (11.)
 *Flower, Lamorock Capt. 3rd R. Sur. M. (11.)
 Flower, Stephen Capt. 86th Regt. (11.)
 Fludyer, C. Lieut.-Col. late Gren. Gds. (11.)
 Foley, Hon. A. F. Col. late Gren. Gds. (11.)
 Foley, Hon. St. Geo. Gerald, CB. Maj. Gen. (11.)
 Pollett, R. W. Webb Capt. Cold. Gds. (11.)
 Forbes, J. Lieut.-Col. late Cold. Gds. (11.)
 Forbes, John, CB. Maj.-Gen. Bombay
 Army (11.)
 Forbes-Leslie, Jonathan Lieut.-Col. late
 78th Highlanders
 Forbes, Stewart Lt.-Col. 1st Roy. Surrey Mil.
 Forbes, Sir William, Bt. Lt.-Col. Aberdeen
 R. Vols. late Lieut. Cold. Gds. (11.)
 *Forbes, Hon. W. F. Lt.-Col. Leitrim R. (11.)
 Ford, Chas. Erskine Maj.-Gen. R.E.
 Ford, Edmund Twiss Major-Gen.
 Ford, James E. Lt.-Col. late Sco. Fus. Gds.
 Forester, Hon. H. T. Lt.-Col. late Gr. Gds.
 Forster, B. L. Lt.-Col. R. A.
 Forster, Charles Capt. 2nd Stafford Mil. (11.)
 Forster, F. B. Lt.-Col. (h.p.) 4th R.I. D. Gds.
 Forster, J. F. Capt. 46th Regt. (11.)
 Forster, Wm. Capt. 60th Rifles (11.)
 Forsyth, Frederick A. Capt. 5th Fus. (11.)
 Forsyth, T. H. Capt. 62nd Regt. (11.)
 Fortescue, Cyril D. Capt. Cold. Gds. (11.)
 Fortescue, E. Francis Capt. 36th Beng.
 N.I. (11.)
 Fortescue, Francis Capt. late Sco. Fus. Gds.
 *Fosbery, Geo. V., B.C. Lieut.-Col. Beng.
 S. Corps. (11.)
 Fosbery, W. T. E. Capt. (h.p.) 77th Regt. (11.)
 *Foster, C. E. Capt. 58th Regt. (11.)
 *Foster, Kingsley O. Capt. the King's Own
 1st Stafford Mil. (11.)
 Fowler, Chas. J. Lt.-Col. R.E. (11.)
 Fowler, G. C. Capt. R.N.
 Fowler, Robert Dashwood Capt. R.N.
 Fox, Augustus H. Lane Col. (h.p.) Gren.
 Gds. (11.)
 Fox, Edwin Capt. (ret.) H.A.C.
 *Fox, L. Loftus B. Capt. R. Longford Rifle
 Mil. (11.)
 Fox, J. T. R. Lane Capt. (ret.) Gr. Gds. (11.)
 Fox, Maxwell Comr. R.N. (11.)
 *Frampton, W. J. Capt. 59th Regt. (11.)
 Frank, P. late Staff-Surgeon (11.)
 Frankland, Colvill Major 103rd Regt. (11.)
 Franken, C. R. Major R.A.
 Franklyn, Edw. J., MD., FRCS. D. Surg.-
 Genl. (11.)
 Franklyn, T. P. Capt. 1st Kent R.V. (11.)
 Fraser, Hon. Alex. E. Lt.-Col. late S.F. Gds.
 (11.)
 Fraser, A. R. Lieut. R. A. (11.)
 Fraser, Charles C., B.C. CB. Col. late
 11th Hussars (11.)
 Fraser, Hon. H. T. Lt.-Col. S. F. Gds. (11.)
 Fraser, J. Keith Lt.-Col. 1st Life Gds. (11.)
 Fraser, James, CB. Col. late 72nd Highrs.
 (11.)
 Fraser, W. J. late Lieut. 1st Tower Hamlets
 Eng. Vols. (11.)
 Freeland, Russell G. Ens. (ret.) 4th K.O. (11.)
 Freer, C. T. Major Leicester Yeo.
 Freese, J. N. A., CB. Gen.
 Freeth, S. Maj.-Gen. R.E. (11.)
 Fremantle, Fitzroy W. Lt.-Col. C. Gds. (11.)
 French, J. D. P. Lieut. 19th Huss. (11.)
 French, P. T. Lt.-Col. (ret.) Bomb. Army
 Frobieher, W. M. Capt. (ret.) 34th Regt. (11.)
 Frome, Edw. Gen. R.E. (11.)
 Fugion, Edw. Major (11.)
 Fulford, Wm. Major (ret.) R.A.
 Fullerton, A. G. Major late 2nd Life Gds.
 Furse, P. G. F. Commissary (11.)
 *Fyers, Henry Thomas Capt. (h.p.) R.A.
 Col. E. and N. York Art. Mil. (11.)
 *Fyers, W. A., CB. Col. late R. Brig. (11.)
 Fynn, Robt. N. late Lt. 2nd W. York Mil.
 (11.)
 GAGE, Hon. E. T., CB. Col. R.A. (11.)
 Gaisford, Horace C. Capt. Gr. Gds. (11.)
 Galloway, EARL OF Capt. late R.H. Gds.
 Galloway, T. J., Lt.-Gen. Col. 49th Regt. (11.)
 *Galton, Douglas, CB. FRCS. Capt. (ret.) R.E.

- Gamble David Lieut.-Col. 47th Lanc. R.V. (11.)
 Gamble, John H. Lieut. 17th Regt. (11.)
 Gamlen, W. B. Ens. late 23rd Mid. B.V. (11.)
 Gammell, Major A. late 43rd Regt.
 Gammell, J. H. H. Major 54th Regt. (11.)
 Gandy, F. Lt.-Col. late S. F. Gds.
 Gardiner, A. M. Lieut. R.N. (11.)
 Gardiner, Chas. G. Lieut. R.N. (11.)
 Gardiner, R. M. late Com. Gen. (11.)
 Gardiner, W. Comr. R.N.
 Gardner, C. H. Capt. 12th Regt. (11.)
 Garbner, G. H. Capt. R.N. (11.)
 Gardner, W. B. Maj.-Gen. (ret.) R.A. (11.)
 Gardyne, C. Greenhill Lieut.-Col. (ret.) Cold. Gds. (11.)
 Garforth, E. St. John Capt. R.N. (11.)
 *Garlick, J. W. Capt. 106th Regt. (11.)
 *Garnham, R. E. W. Major 6th W. York Militia (11.)
 Garnett, A. P. Major 11th Hussars
 Garratt, J. A. T. Lt.-Col. Gren. Gds. (11.)
 Garratt, Francis Lieut. Roy. 1st Devon Yeo. late Capt. 3rd Drag. Gds. (11.)
 Garvoek, Sir John, GCB. Lieut.-Gen. (11.)
 Gascoigne, Chas. Gen. Col. 72nd Regt. (11.)
 Gascoigne, Clifton Lt.-Col. (ret.) G. Gds.
 Gascoigne, W. J. Lt.-Col. Sco. Fus. Gds. (11.)
 Gatacre, W. F. Capt. 77th Regt. (11.)
 Gausson, Alfred W. G. Lieut. 43rd Regt. (11.)
 Gautier, F. E., Capt. ADC. to the Governor of Quebec (11.)
 Gawler, John C. Col. late 73rd Regt. (11.)
 Geary, H. Capt. R. A. (11.)
 Geary, H. le G. Major R.A. (11.)
 Geddes, W. L. Capt. 53rd Regt.
 *German, James Major (ret.) 3rd R. Lanc. Mil. (11.)
 Germon, R. C. H. Major 9th Regt. (11.)
 George, O. W., M.D. Surg.-Major 1st Life Guards (11.)
 Gibbon, Arthur War Office (11.)
 *Gibbons, Charles Capt. R.N. (11.)
 Gibbons, John Dep. Surg.-Genl.
 Gibbs, Charles Major late 2nd Queen's (11.)
 Gibbs, J. E. Lieut. 6th Regt. (11.)
 Gibson, Edwd. Lt. late So. Glou. Mil. (11.)
 *Gilbard, Geo. J. Capt. 71st H. L.I. (11.)
 Gilford, Viscount Rear Adml. (11.)
 Gill, F. Capt. 39th Middlesex R.V. (11.)
 Gillespie, R. Rollo Lt.-Col. 106th Bo. L.I. (11.)
 Gillett, Henry Major 13th Light Inf. (11.)
 Gillett, W. Capt. Uxbridge Yeo. (11.)
 *Gilmore, A. H. Comr. R.N.
 Gimson, Herbert Navigating Lieut. (11.)
 Gilpin, Sir Rich., T., Bt. Col. Bedford. Mil. MP.
 Gippe, H. Capt. (ret.) 9th Regt. (11.)
 Gippe, Reginald Col. S. F. Gds.
 Girardot, G. C. Capt. 106th Regt. (11.)
 Gissing, Charles E. Lieut. R.N. (11.)
 Gladstone, J. R. Lieut. Cold. Gds. (11.)
 Glaspoole, W. A. Lt.-Col. Bo. S. Corps (11.)
 Gleig, A. C. Col. (h.p.) R.A. (11.)
 Gleig, C. E. S. Lt.-Col. (h.p.) 14th Regt.
 Gleig, Rev. G. R., MA. late Chaplain-General to the Forces (11.)
 Glendonwyn, W. R. D. S. Capt. 69th Regt. (11.)
 Glennie, Farquhar Capt. 24th Regt. (11.)
 Glover, Sir John H., GCMG. Capt. RN. (11.)
 Glyn, R. T. Col. 24th Reg. (11.)
 Glyn, Sir Rich. G. Capt. late 1st R. Drags.
 Glyn, Hon. Sidney Carr Capt. late R. Brig. (11.)
 Godbold, G. A. B. Lieut. 12th Regt. (11.)
 *Godman, A. F. Major late 6th Dragoon Guards (11.)
 Godsall, P. T. Lieut. 52nd Regt. (11.)
 Godwin, A. A. Major 103rd R. B. Fus. (11.)
 Godwin-Austen, F. Lt. 2nd W.I. Regt. (11.)
 Godwin-Austen, H. H. Major B. S. C. (11.)
 Goff, Robert Charles Maj. Cold. Gds. (11.)
 Golding, Henry Capt. 37th Regt. (11.)
 Goldsmid, Sir Frederic J., CB., KCSI. Maj.-Gen. late I.A. (11.)
 Goldsmith, George, CB. Adm. (11.)
 Goldsworthy, J. W. Lt. late 86th Regt. (11.)
 *Goldsworthy, W. T. Lieut.-Col. late 91st Highlanders (11.)
 Gonne, T. Major 17th Lancers (11.)
 Goodall, George Lieut. late R.E. (11.)
 Goodenough, O. H. Major R.A. (11.)
 Goodenough, W. H. Col. R.A. (11.)
 Goodlake, G. L., B.C. Col. late Cold. Gds. ADC. to the Queen
 Goold-Adams, F. M. Lieut. R.A. (11.)
 Goolden, G. B. Comr. R.N. (11.)
 Gordou, Alex. W. M.-Genl. (11.)
 Gordon, C. S. S. Evans Col. Gov. R.V. Hosp. (11.)
 Gordon, Cosmo F. M. Lieut. R.N. (11.)
 Gordon-Cumming, Sir W. G., Bart. Capt. S. F. Gds. (11.)
 Gordon, E. C. A. Col. R.E. (11.)
 Gordon, G. Grant Lt.-Col. S. F. Gds. (11.)
 Gordon, Geo. Hamilton Lt.-Col. R.E. (11.)
 Gordon, Henry W., CB. Com.-General
 *Gordon, J. J. H. Lt.-Col. Beng. S. C.
 Gordon, John Lt.-Col. late 47th Regt. (11.)
 Gordon, Robert W. T. Maj. 93rd Highl. (11.)
 Gordon, W. F. F. Major 63rd Regt. (11.)
 Gordon, W. C. Assist. Commissary (11.)
 *Gore, Augustus F. Lt.-Col. Barbadoes Mil. (11.)
 Gore-Browne, Harold Lt. 60th Rl. Rifles (11.)
 Gore, G. R. C. Ormsby-, Lt. Cold.-Gds. (11.)
 Gore, W. R. O. Maj. late 13th L. Drs. MP.
 *Gort, S. P., Viscount. Hon. Colonel Lim. Mil.
 Gosling, Geo. Lieut.-Col. Sco. F. Gds. (11.)
 Gosling, W. C. F. Col. R.H.A. (11.)
 Gosset, W. D. Maj.-Gen. late R.E. (11.)
 Goulburn, Edward Col. late Gr. Gds.
 Gould, Henry O. Lt.-Col. late Gr. Gds. (11.)
 Gould, H. C. Maj. Royal Glamorg. Mil. (11.)
 Gould, R. F. Lieut. late 31st Regt. (11.)
 Gower, Erasmus Capt. late 12th R. Lancers
 Grace, Sheffield Maj. (h.p.) 68th Regt. (11.)
 Graham, Allan Hamilton Major-Gen. (11.)
 Graham, D. A. G. C. Capt. 16th Lancers (11.)

- Graham, Donald Duncan Capt. late Ceylon Rifles (11.)
- Graham, F. W. Capt. 103rd Regt. (11.)
- Graham, Gerald, **G.C.** CB. Col. R.E. (11.)
- Graham, H. A. late Lieut. 7th Fus. (11.)
- Graham, Jas. John Col. (11.)
- Graham, John Maj. Pemb. Art. Mil. (11.)
- Graham, Sir Lumley, *Bart.* Col. (11.)
- Graham, T. P. Lt.-Col. S. F. Gds. (11.)
- Grange, Chas. Walter Major
- Grant, Arthur H. Lt. late 27th Regt. (11.)
- Grant, Edward Fitzherbert Col. (ret.) R.A.
- Grant, Henry D., CB. Capt. R.N. (11.)
- Grant, John M. Lieut.-Col. R. E. (11.)
- Grant, J. M. Lieut. (ret.) 25th K. O. Bordrs.
- *Grant, J. M. Col. Mad. S. Corps (11.)
- Grant, J. Thornton, CB. Maj.-Gen.
- Grant, Robert Major R.E. (11.)
- Grant, Wilmot Capt. Rifle Brigade (11.)
- Grant, W. B. Capt. R.N. (11.)
- *Grant, W. J. E., CB. Col. R. A. *ADC. to the Queen* (11.)
- Grant, W. L. Lieut.-Col. K.O. L. I. Mil.
- Grattan, A. O. D. Lt.-Col. late R.E. (11.)
- Graves-Sawle F.A. Capt. Cold. Gds. (11.)
- Gray, Basil Capt. (unatt.) (11.)
- Gray, William Lieut.-Col. 27th Lanc. R.V., MP. (11.)
- Gray, W. J. Lt.-Col. R. A. (11.)
- Graydon, Geo. Major-Gen. (11.)
- Greathed, Sir E. H., KCB. Maj.-Gen. (11.)
- Greaves, Geo. H. Capt. Adj. 64th Lanc. R.V. (11.)
- Greaves, G. R., CB. Col. (h.p.) 70th Regt. (11.)
- Green, Andrew Lt.-Col. late Rifle Brigade
- Green, G. F. Capt. late 70th Regt. (11.)
- Green, M. S., CB. Col. Bomb. S.C. (11.)
- Green, Sir W. H. R., CB., KCSI. Maj.-Gen. Bomb. S. C. (11.)
- Greenaway, H. C. Capt. 10th Ben. Lanc. (11.)
- Greenhill, Barclay Maj. late Vic. R.V. (11.)
- Greenhill, Barclay C. Lt. Kent Art. Mil. (11.)
- Greenwood, Fred. Lt.-Col. 6th W. York R.V. (11.)
- Greer, H. Harpur, CB. Col. (ret.) 68th L. I.
- Greg, Edwd. H. Capt. late 4th Rl. Lanc. Mil. (11.)
- Gregory, C. H., CMG. Lt.-Col. Eng. and Rail. Staff Corps (11.)
- Gregory, G. B. Capt. late 57th Midlx. R.V., MP. (11.)
- *Gregson, J. D. Capt. 105th Regt. (11.)
- Greig, J. M. Lt.-Colonel R.E. (11.)
- Greville, A. C. Lieut.-Col. (11.)
- Grey, Hon. Sir Fred. W., GCB. Adm. (11.)
- Grey, Hon. George Adm.
- Grier, J. J. Capt. and Adj. 1st Renfrew R.V. Lieut. (ret.) 15th Regt. (11.)
- Grieve, Frank Capt. 46th Regt. (11.)
- Griffiths, A. G. F. Maj. late 63th Regt. (11.)
- *Griffiths, E. St. J. Maj. late 19th Regt. (11.)
- Griffiths, Leonard Major R.A. (11.)
- Grimston, J. W., Visct. Lt. 1st L. Gds. (11.)
- Grimston, Walter J. Major (ret.) R.A. (11.)
- Grundy, F. Leigh Lieut. 6th Regt.
- Gubbins, J. Col. (h.p.) 23rd R. W. F. (11.)
- Guest, Robert Capt. 6th Lanc. R.V. (11.)
- Guinness, B. Lee Capt. (ret.) R.H. Gds. (11.)
- Guise, J. C. **G.C.** CB. Col. (ret.) 90th L.I.
- Gully, Philip Capt. late 22nd Regt. (11.)
- *Gun, Henry A. Capt. R.E. (11.)
- Gunning, C. G. Capt. Madras S.O. (11.)
- Gunter, Edwd. Capt. 59th Regt. (11.)
- Gunter, H. Capt. 73rd Regt. (11.)
- Guy, Sir Ph. M. Nelson, KCB. Lt.-Gen. (11.)
- Gybbon-Spilsbury, Albert Capt. 5th West Yorks. Mil. (11.)
- Gye, Lionel late Lt. R.A. (11.)
- HADOW, Reginald T. Maj. Georgetown Mil. (11.)
- Haines, B. Gilpin late Lt. 18th R.I. (11.)
- Haines, Sir F. P., KCB. Gen. (11.)
- Haldane, G. H. J. Major 64th Regt. (11.)
- *Hale, Lonsdale A. Major R.E. (11.)
- *Hale, Mathew H. Major 26th Regt. (11.)
- Hale, Robt. Col. 7th Hussars (11.)
- Halkett, F. J. C. Lt.-Col. 2nd Tower Hamlets Mil. (11.)
- Halkett, Peter A. Comr. R.N.
- Hall, E. C. Lieut. R.N. (11.)
- *Hall, Geo. Lt.-Col. Durh. Mil. Art. (11.)
- Hall, Geo. C. Lt. 2nd Stafford Mil. (11.)
- Hall, Henry Capt. 15th Hussars (11.)
- Hall, Julian H. Lt.-Col. Cold. Gds.
- Hall, Montagu Major 101st R.B.F. (11.)
- *Hall, Robert, CB.. Rear-Adm. (11.)
- Hall, Saml. W. Assist. Com-Genl. (11.)
- Hall, Sir Wm. H., KCB., FR.S. Adm. (11.)
- Hall, Sir Wm. King, KCB. Adm. (11.)
- Hallett, H. T. Hughes Capt. 57th Regt. (11.)
- Hallett, J. A. Navy Agent (11.)
- Hallowes, John Adm. (11.)
- *Halpin, R. C., Rev., MA. Chaplain to the Forces (11.)
- Haly, Sir W. O'Grady, KCB. Lt.-Gen. (11.)
- Hammersley, John H. Capt. 22nd Regt. Adj. 24th Lanc. R. V. (11.)
- Hamilton, A. C. Capt. R.E. (11.)
- Hamilton, A. Terrick Capt. (ret.) 71st Highl. L.I. (11.)
- Hamilton, Charles, CB. Lt.-Gen. (11.)
- Hamilton, C. E. Lt.-Col. 80th Lan. R.V. (11.)
- Hamilton, Lord Claud, MP. Lieut.-Col. late Donegal Mil. (11.)
- Hamilton, Sir Fred. Wm., KCB. Gen. (11.)
- Hamilton, Geo. J. Major 26th Regt. (11.)
- Hamilton-Gordon, Hon. Sir Alex., KCB. Lieut.-Gen., MP. (11.)
- Hamilton, H. B. Capt. 6th Dr. Gds. (11.)
- Hamilton, I. J. Capt. 8th King's Regt. (11.)
- *Hamilton, J. Glencairn C. Major Lanark Yeo. late 2nd L. Gds. MP. (11.)
- Hamilton, L. H. Lieut.-Col. (11.)
- Hamilton, Mark, MD., BA. Surg. R.N. (11.)
- Hamilton, Robert George Maj.-Gen. R.E.
- Hamilton, R. V., CB. Capt. R.N. (11.)
- Hamilton, R. W. Lt.-Col. late Gr. Gds. (11.)
- Hamilton, T. Bramston Capt. R. A. (11.)
- Hamilton, Sir Wm., *Bt.* Lt.-Col. R.H.A. (11.)
- Hamley, E. B., CB. Col. R.A. (11.)
- Hammersley, Chas. Army Agent (11.)

Hammeraley, Fred.	Col. (11.)	Haughton, J.	Major R.A. (11.)
Hammick, St. V. A.	Capt. 48rd L.I. (11.)	Haughton, John	Lt. 72nd Highlanders (11.)
Hammond, R. H.	Comr. R.N. (11.)	Havelock, Sir Hen., Bart., CB.	U.C. M.P.
Hammond, R. N.	Lieut. R.N. (11.)	Col. (11.)	
Hammond, W. O., Esq.		Hawes, A. G. S.	Lt. (h.p.) R.M.L.I. (11.)
Hamond, H. E.	late Lieut. 1st L. Gds.	Hawes, G. H.	Lieut.-Col. 9th Regt. (11.)
Hampton, Rt. Hon. Lord, GCB., &c. &c. (11.)		Hawkes, R. T.	Lieut. Beng. S.C. (11.)
Hankey, F. A. Capt. late Queen's Westr. R.V. (11.)		Hawkins, Caesar H.	Comr. R.N. (11.)
Hanna, H. B.	Capt. Beng. S.C. (11.)	Hawkins, H. C.	Capt. R.N.
Hansen, G. G.	Major R. A. (11.)	Hawkins, R.	Major late Queen's Westm. R.V. (11.)
Hanson Joseph	late Ens. 1st Surrey R.V. (11.)	Hawshaw, Sir John	Lt.-Col. Eng. & Rail.
Harbord, the Rev. J. B. Chaplain R.N. (11.)		Star Corps (11.)	
Harcourt, F. Venables Col. late Cold. Gds. (11.)		*Hawley, W. H.	Major 14th Regt. (11.)
*Hardie, H. R. Capt. Haddington Mil. A. (11.)		Hay, Hon. C. R.	Lt.-Col. (ret.) S. F. Gds.
Harding, Charles, FRGS. Maj. 19th Surrey R.V. (11.)		Hay, H. M. Drummond	Lt.-Col. late Comdt. R. Perth Rifles
*Hardinge, C.S. Viscount	Lt.-Col. Kent R.V. (11.)	Hay, Sir Hector M., Bt.	late Major Lond. Rifle Brig. (11.)
Hardinge, Hon. A. E., CB.	Maj.-Gen.	Hay, Rt. Hon. Lord John, CB. MP.	Rear Adm. (11.)
*Hardman-Berkeley, J. H.	Lieut. 107th Regt. (11.)	Hay, J. C.	Major 92nd Highlanders (11.)
Hardy, Chas. G.	Lt.-Col. Gren. Gds. (11.)	Hay, W. E.	Major late Indian Army (11.)
Hardy, F.	Col. 84th Regt. (11.)	Haye, J. B.	Lieut. R.N. (11.)
Hardy, John	Maj. 9th Royal Lancers (11.)	*Hayes, John Montague, CB.	Rear Adm. (11.)
*Hare, E. H.	Capt. 11th Regt. (11.)	Hayne, Arthur N.	Lieut. 57th Regt. (11.)
Hare, M. A. S.	Capt. R.N. (11.)	Hayter, A. D.	Lt.-Col. London Rifle Brigade, MP. (11.)
Hare, Hon. Richard	Lt.-Col. late 90th Regt.	Hayward, H. B.	Major 45th Regt. (11.)
Hare, Sir T., Bart. Capt. late 2nd Life Gds. (11.)		Hayward, I. F. Curtis	Capt. 25th Regt. (11.)
Hare, W. A. Horne	Lieut. R.E. (11.)	Healy, R. C.	Capt. Assist. Com-Gen. (11.)
Harford, F. H.	Lt.-Col. S. F. Gds. (11.)	Heastey, G. B.	Lt.-Col. R. M. L. I. (11.)
Harford, F. Lloyd, Lieut. 36th Regt. (11.)		Heath, Sir Leopold G., KCB.	Vice-Adm. (11.)
Harington, A. M. Lieut. Rifle Brigade (11.)		Heathcote, C. T.	Lt.-Col. Bomb. S.C. (11.)
Harington, R. E. S., Maj. Lanark R.V., Capt. late Rifle Brigade (11.)		Heathcote, Eustace	Major Hants Mil. (11.)
Harrison, O.	Lieut. (ret.) 5th Fus.	Heathcote, H. F.	Lieut. 103rd Regt. (11.)
Harness, J. G.	Major 5th Fus. (11.)	*Heathorn, T. B.	Capt. (h.p.) R.A. (11.)
Harness, Sir Hen. Drury, KCB.	Maj.-Gen. R.E. (11.)	Hellard, Saml. B.	Comr. late I. N. (11.)
*Harnett, Edward	Lt.-Col. 7th Royal Dragoon Guards (11.)	Hemans, G. W.	Lt.-Col. Eng. and Rail. S.C. (11.)
Harran, Edward	Capt. 4th Dr. Gds. (11.)	Henderson, E. Y. W., CB.	Col. (11.)
Harrington, S. C.	Purveyor (11.)	Henderson, J. W. C.	Capt. Mad. S. C. (11.)
Harris, Charles B.	Lieut. R.N. (11.)	Henderson, W.	M.-General R.A. (11.)
Harris, Hon. Sir Edw. A. J., KCB., Vice-Adm. (11.)		Hennell, S. Col. (ret.)	Bombay Army (11.)
Harris, Geo.	Capt. R.E. (11.)	Henniker, Major Hon. A. H.	Lieut. C.G. (11.)
Harrison, Henry	Lt. late 8th Hussars (11.)	Henry, G. O.	Col. R. A.
Harrison, W. A.	late Sur. Hants Mil. Art.	Henry, J. L. V.	Lieut. 2nd B. N. B. Drags. (11.)
Harrison, Wm.	Capt. 19th W. York R.V. (11.)	Hepburn, Henry P., CB.	M.-Genl. (11.)
Hart, John	Capt. 100th Regt. (11.)	Herbert, Arthur James, CB.	Maj.-Gen. (11.)
Harty, Jos. Mark	Col. (11.)	Herbert, C. J.	Capt. (ret.) Gr. Gds. (11.)
Harvey, Chas. Elwin	Major R.E.	Herbert, H. A.	Capt. (ret.) Cold. Gds. (11.)
Harvey, E.	Capt. R.E. (11.)	Herbert, Hon. W. H.	Col. late 4th W. I. Regt. (11.)
Harvey, John E. A.	Lieut. 42nd Highrs. (11.)	Herdman, Alfred	Lieut. late 5th Lancers (11.)
*Harwood, Ed. Lt.-Col. late 2nd Som. Mil. (11.)		Hereford, Chas.	Major 19th Regt. (11.)
Harwood, J. A. P. K.	Capt. late 13th L.I.	Hertford, MARQUESS of	Gen. (11.)
Hallett, A. K.	Capt. R.E. (11.)	Hewett, Edw. O.	Lieut.-Col. R.E. (11.)
Haslewood, Clement A.	Lt. 12th Midx. R.V. (11.)	Hewett, Sir W. N., U.C., KCB.	Capt. R.N. (11.)
Hastings, Warren, Lt. 2nd W.I. Regt. (11.)		*Heyland, A. R.	Capt. 1st Bom. Lan. (11.)
Hatchell, George	Major 60th Rl. Rifles (11.)	Heyland, A. T., CB.	Maj.-Gen. (11.)
Hatherton, Lord	Col. 2nd K.O. Staff. Mil.	Heyland, H. K.	Lieut. R.N. (11.)
Hutton, E. H. F.	Capt. late Northampton Mil. (11.)	Heyland, J. R. K. L.	Lieut. R.A. (11.)
Hutton, Villiers L.	Lt.-Col. late Gr. Gds. (11.)	Heywood, J. M.	Major R.E. (11.)
Hutton, Villiers	Capt. Gr. Gds. (11.)	Hibbert, J. Nembhard	Major late 97th Regt.
		Hichens, Wm.	Lt.-Col. R.E. (11.)

- Hickes, R. L. Capt. London Rifle Brig. (11.)
 Hickman, D. H. Lt.-Col. Ben. S. C. (11.)
 Hicks, John Lieut. R.N. (11.)
 Hicks, W. A. Capt. 3rd Duke of
 Lancaster's Mil. (11.)
 Hickson, R. A. Capt. 3rd Buffs (11.)
 *Higgins, F. Major 6th Lanc. R.V. (11.)
 Higgins, W. F. late Colonial and
 War Depts. (11.)
 Higginson, C. T. M. Capt. 2nd B. Cav. (11.)
 Higginson, G. W. A., CB. Col. Gren. Gds.
 (11.)
 Hight, Edward Lieut. R.N.R. (11.)
 Hill, E. Rowley Lt.-Gen., Col. 5th Fus. (11.)
 Hill, Hon. Geoffroy R. C. Capt. (ret.) R.H.
 Gds.
 Hill, G. H. H. Ens. (ret.) 93rd Highrs. (11.)
 Hill, John Thomas General
 Hill, Pascoe G., Rev. late Chaplain R.N. (11.)
 Hill, Rowland Capt. 39th Regt. (11.)
 Hill, Stephen J., CB. Col. (11.)
 Hill, Thomas Capt. late 11th Regt. (11.)
 Hill, W. Col. (11.)
 Hills, J., W.C., CB. Col. R.H.A. (11.)
 Hillyard, G. A. Capt. Rifle Brigade (11.)
 Hime, Frederick Major R.E.
 Hime, H. W. L., Capt. R.A. **Gold
 Medalist, Military Essay, 1875 (11.)**
 *Hinchingsbrook, Viscount Lt.-Col. Gr. Gds.
 Hind, Charles Major-Gen.
 Hinde, John, CB. Major-Gen. (11.)
 Hire, Henry W. Capt. R.N. (11.)
 Hirst, R. A. H. Major late W. Essex Mil.
 (11. 1s.)
 Hobson, Frederick T. Capt. 3rd Buffs (11.)
 Hodgson, Geo. E. Capt. (ret.) 44th Regt. (11.)
 Hogarth, Alex. Major 1st Aberdeen R.V. (11.)
 Hogg, Adam Capt. 2nd Belooch Regt. (11.)
 Hogg, John R. Capt. R.E. (11.)
 Holcombe, F. Major (ret.) R.A. (11.)
 Holden, Henry Lieut.-Col. late 13th Light
 Dns. (11.)
 Holdsworth, J. K. Major R. A. (11.)
 Holland, A. G. Lieut. 15th Hussars (11.)
 Holland, Swinton C. Lieut. R.N. (11.)
 Hollingsworth, T. S. Surg. 62nd Regt. (11.)
 Holmes, J. R. Capt. late 8th Orkney A. V. (11.)
 Holmesdale, Viscount, MP. Capt. late
 Cold. Gds. (11.)
 Holroyde, J. B. Capt. 8th W. Y. Art. V. (11.)
 Holt, G. Trefusis Capt. late Indian Navy
 (11.)
 Home, Hon. Cospatrick D. Lieut. Rifle
 Brigade (11.)
 Home, D. M. Capt. R. H. Gds. (11.)
 Home, Robert, CB. Lt.-Col. R.E. (11.)
 Home, Hon. W. S. D. Lt.-Col. Gr. Gds. (11.)
 Home-Drummond-Moray, W. A. Lieut.
 Scots Fus. Gds. (11.)
 Hood, F. W. Viscount Lt.-Col. (ret.) Gr.
 Gds. (11.)
 Hood, W. C. Capt. 2nd Queen's Royals
 Hood, W. H. Comr. R.N.
 Hooke, H. H. Capt. 4th
 Hoole, James Capt. 5th
 Hooper, Fred. Chas. Capt.
 Hope, Charles Lieut.
- Hope, Chas. Wm. Capt. R.N. (11.)
 Hope-Edwards, H. J. Lt. 60th Rifles (11.)
 Hope, G. R. Comr. R.N. (11.)
 Hope, H. P. late Mate R.N. (11.)
 Hopkins, J. O. Capt. R.N. (11.)
 Hopkinson, C. Army Agent
 Horne, Charles J. Maj. 16th Regt. (11.)
 Horner, John Capt. late 55th Regt. (11.)
 Horsford, Sir Alfred H., GCB. Lt.-Gen. (11.)
 Hort, Sir J. J., Bart., CB. Major-Gen. (11.)
 Horton, Geo. W. Col. late 7th Dr. Gds. (11.)
 Horton, William Capt. R.N. (11.)
 Hoseason, J. C. Capt. R.N. (11.)
 Hoste, D. E., CB. Col. R.A. (11.)
 Hoste, Geo. H. Esq. Admiralty (11.)
 Hotham, Charles F. Capt. R.N. (11.)
 Howard, F. O. Lieut. Rifle Brigade (11.)
 Howard, H. R. Capt. 3rd Herts R. V. (11.)
 Howe, EARL, CB. Maj.-Gen.
 Howes, Geo. Capt. R.N.
 Howell, Sir Thos., Kt. Director of Contracts
 War Office (11.)
 Howitt, M. B. Capt. 3rd R. Surrey Mil. (11.)
 *Hozier, H. M. Capt. late Assist. Contr. (11.)
 *Hozier, John Wallace Capt. 2nd R.N.B.
 Dragoons (11.)
 Hubbard, A. G. Lt. 3rd Bucks R.V. (11.)
 Hudson, John Lt.-Col. late Beng. S.C. (11.)
 Huggins, John Capt. late 20th Mid. R.V. (11.)
 Hughes, C. A. Capt. late 2nd Life Gds.
 Hughes, J. W. Lt.-Col. 54th Regt. (11.)
 Hull, Thos. A. Staff Com. R.N. (11.)
 Hume, Francis A. Capt. R.N. (11.)
 Hume, Henry, CB. Col. (ret.) Gr. Gds. (11.)
 Hume-Spry, G. Fredk., MD. Surg.-Major,
 2nd Life Gds. (11.)
 Humfrey, T. Blake Capt. 8th or King's (11.)
 Humphry, E. W. Capt. (h.p.) R.E. (11.)
 Hunt, Chas. B. Lieut. 4th Surrey R.V. (11.)
 Hunt, J. M. F. Lt. Hants Art. Mil. (11.)
 Hunt, Wm. G. F. Asst. Paymr. (ret.) R.N. (11.)
 Hunter, Montgomery Col. Beng. S. C. (11.)
 *Hunter, Saml. A. Lt.-Col., late 101st R.B.F.
 (11.)
 Hunter, T., MD. D.I.G. of Hospitals
 Hunter, T. R. Lieut. late I. N. (11.)
 Hurst, W. B. Lieut. R.E. (11.)
 Hutchins, Alfred G. Capt. 39th Mad. N. I.
 (11.)
 Hutchins, F. Arthur Capt. 4th Huss. (11.)
 Hutchinson, A. J. Lt. (ret.) 23rd R.W. F.
 Hutchinson, C. S. M.-Genl. R.E. (11.)
 *Hutchinson, John Hon. Col. 8th Lanc.
 R.V. (11.)
 *Hutchinson, R. R. Capt. R. L. Mil. (11.)
 Hutchinson, W. L. Inspec. of Cape Frontier
 Police (11.)
 Hutchinson, W. Nelson Gen. Col.
 33rd Regt. (11.)
 Hutchison, H. McL. Capt. 14th Regt. (11.)
 Hutton, C. M. Lt. 52nd Regt. (11.)
 Hyde, G. Hooton Major-Gen. (ret.) R.A.
 Hylton, Lord Capt. late Cold. Gds.
- IAGO, Arthur Capt. 2nd Middx. R.V. (11.)
 Ibbetson, C. P. Lt.-Col. (h.p.) 89th Regt.
 Ibbetson, C. V. Capt. 4th Dr. Gds. (11.)

- Inglall, W. L., CB. Major-Gen. (11.)
Inglefield, S. H. S. Lt.-Col. R.A. (11.)
Ingles, John Comr. R.N. (11.)
Ingles, W. L. Major (h.p.) 16th Regt. (11.)
Inglis, C. D. Capt. R.N. (11.)
Inglis, R. W. Capt. Lon. Irish R.V. (11.)
Inglis Thos. Col. R.E. (11.)
Inglis, Wm., CB. Major-Gen. (11.)
Ingram, Aug. H. Rear-Adm. (11.)
Ingram, E. R. B. Lt. 69th Regt. (11.)
Innes, Alex. Major Aberdeen Art. V. (11.)
Innes, J. McLeod, C. C. Lt.-Col. R.E. (11.)
Innes, Percival R. Lt.-Col. late I.A. (11.)
Irby, J. J. C. Capt. Adj. Chelsea Hosp. (11.)
Irvine, M. B., CB., CMG. Dep. Com. Gen. (11.)
Ives, C. R. St. J. Lt.-Col. R. H. Gds. (11.)
Ives, G. M. Lieut.-Col. 36th Middx. R.V. late Cold. Gds. (11.)
JACKSON, F. G. Capt. 21st R.N.B. Fus. (11.)
Jackson, H. M. Lieut. R.A. (11.)
Jackson, J. B. Capt. late 21st R.N.B. Fus. (11.)
Jackson, J. M. Capt. R.N. (11.)
Jackson, Randle Capt. late 8th Hus. (11.)
Jacob, H. E. Maj.-Gen. Bom. S. C. (11.)
Jacob, Sir George Le Grand, CB. KCSI. Major-Gen. (11.)
Jacobs, M. H. Capt. H. A. C. (11.)
James, Edm. R. Major R.E. (11.)
James, F. W. Lieut. 9th Regt. (11.)
James, W. C. Lt. 2nd R.N.B. Drags. (11.)
James, W. H. Lt. R.E. (11.)
Jarrett, C. B. Capt. (ret.) Gr. Gds. (11.)
Jarris, S. P., CMG. Col. late 82nd Regt. (11.)
Jary, Robt. H. Maj. late 12th R. Lanc. (11.)
Jay, Jno. Livingstone late Sec. to Governor, Greenwich Hospital (11.)
Jay, W. C. Capt. H. A. C. (11.)
James, E. Major late Rifle Brigade (11.)
Jebb, Fredk. W. Lt.-Col. 67th Regt. (11.)
Jefferys, E. F. Lieut. R.N. (11.)
Jefferys, Edmd. R., CB. Maj.-Gen. (11.)
Jefferys, John Major Sussex Art. Volun-
ters, Lt. (ret.) Madras Art. (11.)
Jenkins, Robt., CB. Rear-Adm. (11.)
Jenker, Stephen W. Capt. R.E. (11.)
Jackson, Alfred Comr. R.N. (11.)
Jackson, J. H., MD. late Asst.-Surg. 49th Regt.
Jenne, John Lt.-Col. 86th Regt. (11.)
Jones, H. J. W., Lieut.-Col. late R.A., MP.
Jones, Hon. J. E. L. Lt. 7th Hussars (11.)
Jones White, H. Capt. 77th Regt. (11.)
Jones, E. S. Capt. (h.p.) 7th R. Fus. (11.)
Jones, Sir W. F. Drummond, CB., KCMG.,
Col. R.E. (11. 1c.)
Jones, H. C. Lt.-Col. late Cold. Gds. (11.)
Jones, Thos. Capt. late 2nd R. N. B. Dragoons (11.)
Jones, Hon. J. Strange Lt.-Col. late
F. Gds. (11.)
Jones, Thomas Major 46th Regt. (11.)
Jones, Cecil F. W. Comr. R.N. (11.)
Jones, Sir E. B., KCB. Maj.-Gen. R.A. (11.)
Johnson, H. J. Lt. 80th Regt. (11.)
Johnson, J. W. D. Lt. late 21st Hussars (11.)
Johnson, W. V. Capt. late 90th L.I.
Johnston, D. A. Lieut. R. E. (11.)
Johnston, Thos. H. Gen. Col. 66th Regt.
Johnston, W. F. Col. late Gren. Gds.
Johnstone, Fred. E. Capt. R.N. (11.)
Johnstone, F. F. Lieut. 16th Regt. (11.)
Johnstone, Hon. H. Butler Col. Comt.
Scottish Borderers Mil. MP. (11.)
Jones, Arthur Paymaster R.N. (11.)
Jones, Chas. Lieut. R.A. (11.)
Jones, Chas. G. Capt. R.N. (11.)
Jones, D. G. Capt. late R.E. (11.)
*Jones, Jenkin Col. R. E. (11.)
Jones, Sir John, KCB. Major-Gen. (11.)
Jones, Sir Lewis T., GCB. Adm. (11.)
Jones, Lewis J. F. Col. late Dep. Batt. (11.)
Jones, Mainwaring Capt. H. A. C. (11.)
Jones, R. W. Lieut. R.N. (11.)
Jones, W. Gore Capt. R.N. (11.)
Jopp, A. A. Capt. R.E. (11.)
Jopp, Keith Lt.-Col. Bom. S. Corps (11.)
*KAIN, Geo. James. Capt. late 1st Middx. Eng. Vols. (11.)
Kearne, G. M. Lt.-Col. (ret.) 2nd Queen's (11.)
Keane, Hon. H. F., CB. Col. R.E. ADC. to the Queen
Keays-Young, H. W. Capt. 18th R. Ir. (11.)
Kebbel, W. H. Major H.P.
Keirle, R. Capt. 1st M. Art. Vols. (11.)
Keith, W. Major R.E. (11.)
Kellie, James Lieut. R.E. (11.)
Kellie, Robt. H., Lieut. 82nd Regt. (11.)
Kelly, J. G. Lieut. Beng. S. C. (11.)
Kelly, J. L. Capt. 62nd Regt. (11.)
Kelly, Sir R. D., KCB. Major-Gen. (11.)
Kemball, Sir A. B., CB., KCSI. Maj.-Gen. (11.)
Kemp, F. R. B. Lieut. R.N. (11.)
Kennedy, A. J. Capt. R.N. (11.)
Kennedy, J. P. Lt.-Col. (h.p.) 42nd Royal Highlrs. (11.)
Kennett, V. H. Barrington Lieut. Royal
Elthorne Mil. (11.)
Kensington, Lord Col. late Cold. Gds.
Kenyon-Slaney, W. S. Capt. Gr. Gds. (11.)
Keppel, Hon. Sir H., GCB. Adm. (11.)
Kerans, Percy G. Lieut. 2nd W. I. Regt. (11.)
Kerr, C. R. Lieut. 102nd Regt. (11.)
Kerr, Henry Major 7th Fusiliers (11.)
Kerr, Herbert Capt. late 17th Regt. (11.)
Kerr, Lord Mark, CB. Lieut.-Gen. (11.)
Kerr Lord Ralph D. Lt.-Col. 10th Huss. (11.)
Kerr, Robert Dundas Col. R.E. (11.)
Kerrich, W. D'Oyly Lt.-Col. R.A. (11.)
Kettlewell, W. W. Lt. late 27th Regt. (11.)
Key, Geo. Wm. Lt.-Gen., Col. 15th Hus.
Keyes, C. P., CB. M.-Genl. Madras S.C. (11.)
Kilcoursie, Viscount late Lieut. R.N. (11.)
King, Edw. R. Col. late 36th Regt.
King, Eyre late Lieut. 47th Regt.
King, Geo. S., MD. Surg.
King, Sir Geo. St. Vincent, KCB. Adm. (11.)
King-Harman, M. J. Capt. R.A.
King, John R. Major R.

- King, W. G. N. Capt. R.N. (11.)
 Kingscote, R. N. F., CB. Lt.-Col. late
 S. F. Gds. MP.
 Kingsford, T. H. Capt. late 1st Roy. Surrey
 Militia (11.)
 Kinloch, Alex. Capt. late Gren. Gds.
 Kinloch, Geo. H. A. Capt. 13th Regt. (11.)
 Kirby, W. H. Col. (11.)
 *Kirk, James B. Lt.-Col. 91st Highlrs. (11.)
 Kirkland, J. A. Vesey Major-Gen. (11.)
 *Knight, H. S. G. S. Lt.-Col. late 19th Regt.
 (11.)
 *Knollys, Henry Capt. R.A. (11.)
 Knollys, *Right Hon. Sir W. T.*, KCB. Gen.
 Col. 62nd Regt. (11.)
 Knollys, W. W., FRGS. Maj. 93rd High. (11.)
 Knowles, C. B. Major 67th Regt. (11.)
 Knox, G. W. Lt.-Col. Sco. Fus. Gds.
 Knox, T. E., CB. Maj.-Gen. (11.)
 *Knox, Richard Maj.-Gen.
- LACON, W. Stirling late H. E. I. C. S. S. (11.)
 Lacy, T. E. Maj.-General (11.)
 Laing, Joseph Capt. 14th Regt.
 Lake, H. Atwell, CB. Col.
 L'Aker, J. Capt. 1st Lond. Engr. Vols. (11.)
 Lambard, Henry Capt. 45th Regt. (11.)
 Lambert, John Arthur Lt.-Gen.
 Lambert, R. Capt. late 43rd L. I.
 *Lambert, Rowley, CB. Rear-Adm. (11.)
 Lambert, Walter M. Capt. R.M.A. (11.)
 Lambton, Arthur Lieut.-Col. Cold. Gds.
 Lambton, Fran. Lt.-Col. late S. F. Gds. (11.)
 Lamont, James Dep.-Lieut. Bute
 Lamotte, C. W. Lt.-Col.
 *Lamprey, Jones, MB. Surg. Major 67th
 Regt. (11.)
 L'Amy, J. Ramsay Major late Forfar and
 Kincardine Art. Mil. (11.)
 Lane, Fred. Wm. Capt. late 67th Regt.
 Lane, H. J. Bagot Lt.-Col. (ret.) Cold. Gds. (11.)
 Lane, H. P. Maj. R.A. (11.)
 Lane, J. Theophilus, CB. Lt.-Gen.
 Langford, Hercules E. LORD Capt. Gr. Gds.
 Langhorne, A. R. M. Lt. late 52nd Regt. (11.)
 Lascelles, *Hon. E. W.* Maj. late W. York Mil.
 Lascelles, H. U., Viscount Capt. late Gr. Gds.
 Lascelles, Walter R. Maj. Rifle Brig. (11.)
 La Touche Geo. D. Capt. 2nd W. I.
 Regt. (11.)
 Latour, W. Young Lt.-Col. Gr. Gds. (11.)
 Laughton, J. K., Esq., R.N., MA. Naval
 Instructor (11.)
 Laurie, J. W. Col. D.-A.-Gen. Canadian Mil.
 Law, E. F. G. late Lieut. R.A. (11.)
 Law, F. T. A. Major R.A. (11.)
 Law, *Hon. H. S.* Capt. late 28th Regt. (11.)
 Lawley, *Hon. R. N.* Capt. late 2nd L. Gds. (11.)
 Lawlor, D. A. S. Lieut. late 13th L. I. (11.)
 Lawrence, H. J. H. Batt. Surg. Gr. Gds.
 Lawrence, W. A. Capt. Ben. S. Corps (11.)
 Lawrence, W. W. Lt. 18th R. I. Regt. (11.)
 Lawrenson, John Gen. Col. 18th Huss. (11.)
 *Layard, B. V. Capt. 28th Regt.
 Layard, W. T. Maj.-Gen. (11.)
 Lazenby, James Major 100th Regt. (11.)
 Leach, Edm. Lieut.-Col. 50th Regt. (11.)
- Leach, E. P. Lieut. R.E. (11.)
 Leahy, Arthur Lt.-Col. R.E. (11.)
 Leake, H. Capt. E. Y. Mil. late 70th Regt. (11.)
 Leather, John Towleron Capt. late 2nd
 Dorset Art. Vols. (11.)
 Le Blanc, T. E. Capt. late 37th Regt.
 Leconfield, Lord H. W. Capt. late 1st L. Gds.
 Le Cocq, H. Lt.-Col. R. A. (11.)
 *Lee, John W. Capt. Q. O. L. I. Mil. (11.)
 Lee-Warner, C. H. J. B. Capt. late S. F. Gds.
 (11.)
 Lecke, Ralph Capt. Gr. Gds. (11.)
 Leeman, Joseph Lieut. E. N. R. (11.)
 Lees, T. Evans Lt.-Col. 31st Lanc. R. V. (11.)
 Lefroy, J. H., CB. FR.S. Maj.-Gen. R.A. (11.)
 Le Geyt, W. B. Dep.-Com. (11.)
 Legge, Compton Lieut. late Oxford Mil. (11.)
 Legge, *Hon. E. H.* Lt.-Col. late Cold. Gds. (11.)
 Legge, *Hon. H. C.* Lt. Cold. Gds. (11.)
 Legge, *Hon. Henrice* Capt. 9th Lanc. (11.)
 Legge, W. D. Capt. (h.p.) 5th Fus.
 Leggett, R. A. Capt. late 69th Regt. (11.)
 Legh, George Cornwall Maj. 2nd R.
 Cheshire Mil. MP. (11.)
 Le Grand, F. G. Capt. R.M.L.I. (11.)
 Legh, H. M. C. Lt.-Col. late Gren. Gds.
 (11.)
 Le Grice, Frederick S. Capt. R.A.
 Leigh, Lord Lord Lieut. Warwickshire
 Leighton, F. Major 8th Mid. R. V. (11.)
 Le Mesurier, A. A. Maj. 14th Regt. (11.)
 Lempriere, A. R. Major R.E. (11.)
 Lempriere, Henry Major (ret.) R.A. (11.)
 Lennard, T. G. B. Lt. late 5th Dr. Gds. (11.)
 Lennox, Lord A. C. Gordon Capt. Gr. Gds. (11.)
 Lennox, Lord C. Francis Gordon Capt.
 S. F. Gds. (11.)
 Leonard, Peter, MD. Insp.-Gen. of
 Hosps. and Fleets (11.)
 Le Patourel, H. Capt. E. Y. Mil.
 Leslie, George Colonel B.A. (11.)
 Leslie, John H. late Capt. 71st High. L. I. (11.)
 Lethbridge, Sir Wroth Acland, *Bart.* late
 Lt. R. B. (11.)
 Leveson, E. J. Lt. 5th Kent Art. V. (11.)
 Lewes, W. L. Capt. (ret.) 48th Regt.
 Lewin, W. H. Com. (ret.) R.N., Sub-Lieut.
 Roy. Naval Vols. (11.)
 Lewis, Charles Algernon Gen. (11.)
 Lewis, H. F. P. Capt. R.A.
 Lewis, John Edw. Lt.-Col. (ret.) 68th Regt.
 Lewis, J. F. Lieut. R.E. (11.)
 Lewis, J. Owen Lt.-Col. late 37th Regt.
 Leycester, E. M. Capt. R.N. (11.)
 Leyland, T. N. Lt.-Col. Denbigh Yeo. late
 Capt. 2nd Life Gds.
 Leyland, T. Capt. Denbigh Yeo. late
 Lieut. 2nd L. Gds.
 Liddell, R. S. Capt. 10th Hussars (11.)
 Liddon, Matthew Capt. 8th or King's (11.)
 Lidgett, T., MD. Surg. R. Hos-
 pital, Chelsea (11.)
 Lillie, G. A. H. Lieut. late Ben. S.C. (11.)
 Lindoe, F. E. Lieut. 81st Regt. (11.)
 Lindsey, Charles Lieut. R.N. (11.)
 Lindsey, *Hon. C. H.*, Lieut.-Col. 11th
 Middlx. R. V. late Lt.-Col. Gren. Gds. (11.)

- *Lindsay, H. Gore Capt. late R. B.
 Lindsay, LORD James L. Lt. late Gr. Gds.
 Lindsay, Robert J. Loyd, **W.C.** Lt.-Col.
 H.A.C. late Lt.-Col. S.F.Gds. MP. (11.)
 Linton, J. K. Master (ret.) I. N.
 Listowell, EARL of Capt. late S. F. Gds.
 Litchfield, E.F. Lt.-Col. late Beng. N. I. (11.)
 Litchford, E. B. Lieut. late 48th Beng. N.I.
 Little, H. A. Major Beng. S. C. (11.)
 Littledale, Edward Major late 1st Roy. Drs.
 Littledale, F. C. H. Lieut. 29th Regt. (11.)
 Lloyd, Arthur C. Lieut. 45th Regt. (11.)
 Lloyd, C. W. Major 16th Regt. (11.)
 Lloyd, Francis T. Capt. R.A. (11.)
 Lloyd, G. M. Lieut. R.A. (11.)
 Lloyd, Neaham Y. Lieut. 82nd Regt. (11.)
 Lloyd, R. O. Lieut. R.E. (11.)
 Lloyd, T. H. Capt. R. A. (11.)
 *Lloyd, Thomas Capt. 35th Regt.
 Lloyd, Thos. F. Lieut.-Col. 98th Regt. (11.)
 Lloyd, Rev. W. V., MA. R.N. FRGS. Naval
 Inst. (11.)
 Luellyn, W. R. Major R.A. (11.)
 Loch, Geo. Capt. late Duke of Lancaster's Yeo. MP.
 Loch, H. B., CB, Lt.-Col. 2nd Cheshire Mil.
 and Lieut.-Gov. Isle of Man (11.)
 Loch, W. Capt. 19th Bengal Cav. (11.)
 Lochner, C.P. Maj. late 39th Midx. R.Y. (11.)
 *Lock, A. C. Knox Lt.-Col. 50th Regt. (11.)
 Lock, H. Lt.-Col. 108th Regt. (11.)
 Lockhart, Arch. Inglis, CB. Maj.-Gen.
 Lockwood, A. R. M. Capt. Cold. Gds.
 Lockock, Herbert Major R.E. (11.)
 Loder, F. C. J. Lieut. 82nd Regt. (11.)
 Lodge, Frank Capt. R.A. (11.)
 Lodge, I. W. Lieut. 5th W. Y. Mil. (11.)
 Lodge, W. R. Capt. (ret.) Indian Army
 Logan, Sir Thomas Galbraith, KCB. MD.
 late D.G. A.M.D. (11.)
 Logie, Cosmo Gordon, MD. Dep. Surg.-Gen.
 (11.)
 *Lombard, G. C. S. Capt. and Adj. Civil
 Service R. Vols. (11.)
 Longden, H. Errington, CB. CSI. Maj.-Gen.
 (11.)
 Longfield, F. Major 8th or King's (11.)
 Longford, The EARL of, KCB. Maj.-Gen. (11.)
 Longmore, Thos., CB. D.I.G. of Hosps. (11.)
 Lordale, EARL of Major Westmoreland
 and Cumberland Yeomanry (11.)
 Loring, Sir Wm., KCB. Vice-Adm. (11.)
 Lurell, John Williamson, CB. Col. R.E. (11.)
 Lw, Alex., CB. Maj.-Gen. (11.)
 Lw, Sir John, KCB. G.CSI. Gen. (11.)
 Lw, A. Vice-Adm.
 *Lw, E. W. D., CB. Col. (11.)
 Lw, W. D. Capt.
 *Lw, R. W., CB. Col. late 47th Regt. (11.)
 Lw, F. W. Comr. R.N. (11.)
 Lw, C. E. Capt. R.E. (11.)
 Lw, John K., CB. Gen. (11.)
 Lw, E. G. A. Col. (h.p.) late 62nd Regt. (11.)
 Lw, W. G., CB. Rear Adm. (11.)
 Lw, G. E. EARL of, GCB. Gen. Col. 1st
 Gds.
 Lw, Louis A. Capt. late 6th L. R.V. (11.)
- Ludlow, John Maj.-Gen. (11.)
 Lugard, R. J. Capt. 4th King's Own R. (11.)
 Lumsden, H. W. Lieut. Col. late R.A. (11.)
 Lushington, Sir Stephen, GCB. Adm. (11.)
 Lynch, E. J. Capt. 3rd Buffs (11.)
 Lynch, Staunton, G.S. Capt. (ret.) 14th Hus.
 (11.)
 Lynch, W.W. Lt.-Col. 10th Regt. (11.)
 Lynn, James Lt.-Col. (ret.) R.E.
 Lyon, Francis Major R.A. (11.)
 Lyon-Fremantle, A. J. Lt.-Col. Cold. Gds.
 Lyons, Algernon McL. Capt. R.N. (11.)
 Lyons, W. Col. (11.)
 Lysons, D., CB. Major-Gen., Quarter-
 Master Genl. (11.)
 Lyttelton, Hon. C.G. Lt. Worcester Yeo. (11.)
 Lyttelton, the Hon. N. G. Lt. R. Bgde. (11.)
- MABERLY, W. Leader Lt.-Col.
 McBean, W. Lt.-Col. (ret.) 1st W.I. Regt. (11.)
 McCallum, G. K. Capt. 92nd Highs. (11.)
 MacCarthy, R. H. Lt. 4th K. O. Regt. (11.)
 McCausland, M. F. H. Capt. R.A. (11.)
 *McGwire, E. T. St. L. Col. 1st Royal
 Scots (11.)
 McCleverty, Wm. A. Gen. Col. 48th Regt.
 (11.)
 McClintock, Sir F. Leopold, KT. FRs.
 Rear-Adm. (11.)
 M'Coy, T. R. Capt. late 65th Regt.
 McCoy, Washington J. Lt. South Devon.
 Mil. (11.)
 *M'Crea, J. D. Capt. R.N. (11.)
 McCreagh, M. Maj. (ret.) 4th R.I. Dr. Gds. (11.)
 *McDonald, A. M. Col. (11.)
 Macdonald, J.H.A. Lt.-Col. Edin. City R. V.
 (11.)
 Macdonald, N. Major 5th Fus. (11.)
 Macdonald, Wm. Lieut.-Col. B.S.O. (11.)
 MacDonnell, H. J. Capt. late 12th Regt. (11.)
 MacDonnell, John R. late Maj. 19th Midx.
 R.V. (11.)
 McDonough, S. Maj. late 3rd W.I. Regt. (11.)
 M'Dougall, Patrick L. Maj.-Gen. (11.)
 McDougall, Niel, Esq. Controller's Depart-
 ment of the Navy (11.)
 McDougall, W. B. Lt. 78th Highlrs. (11.)
 MacFarlan, D. Lt.-Col. R. H. A. (11.)
 *Macgregor, H. G. Capt. 29th Regt. (11.)
 *MacGregor, Chas. M., CSI. Col. Ben. S.C.
 (11.)
 M'Gregor, Sir Duncan, KCB. Gen. (11.)
 McGregor, Sir Geo., KCB. Major-Gen. (11.)
 McGeral-Hogg, Sir J., KCB. Lt.-Col. late
 1st Life Gds. MP. (11.)
 M'Grigor, Sir Chas. Bart. Army Agent
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 Mackay, H. A. Capt. R.A. (11.)
 Mackay, Henry Fowler Capt.
 Mackean, Kenneth Lieut. R.E. (11.)
 McKean, A.C. Lieut. 6th Innisk. Drag. (11.)
 Mackenzie, Hugh Maj. (11.)
 Mackenzie, J. D. Major late 75th Regt.
 (11.)
 Mackenzie, John K. Lt.-Col. (unatt.) (11.)
 McKillop, H. F. Capt. R.N. (11.)
 Mackinnon, D. H. Lieut.-Col. S.O.F

Mackinnon, G.H., CB.	Gen. (11.)	Martin, Edw.	Lt. late 28th Mad. N. I. (11.)
Mackinnon, L. B.	Capt. R.N. (11.)	*Martin, Francis	Capt. R.N. (11.)
Mackinnon, L. D.	Capt. Cold. Gds. (11.)	Martin, G. W. T.	Lt. late 46th Reg. (11.)
Mackinnon, W. A., CB.	Dep. Surg.-Gen.	Martin, Jas.	Staff-Surg.-Maj. A.M.D. (11.)
*Mackinnon, W. C.	Capt. 3rd Buffs (11.)	Martin, James J.	Staff-Surg. R.N. (11.)
Mackinnon, W. H.	Capt. Gren. Gds. (11.)	Martin, Thos.	Lt.-Col. (11.)
*Maclean, F. D.	Lt.-Col. late 18th Huss.	Martin, W. L.	Comr. R. N. (11.)
Maclean, P.	Major-Gen.	Martin, Sir Wm. F., Bart.	GCB. Adm. (11.)
Maclean, W. C., MD. CB.	Dep. Insp. Gen. (11.)	Marx, John L.	Lt. R.N. (11.)
McLaughlin, Edwd.	Major R.A. (11.)	Massy, H. H., CB. MD.	Surg.-Gen.
MacLeod, Norman	late Lt. H. A. O.	Matheson, Duncan	Lt. 6th Innis. Drs. (11.)
McLeod, W. C.	Lt.-Gen. (11.)	Matthews, F. P.	Capt. late 1st Sussex R.V. (11.)
McMahon, Alex. R.	Lt.-Col. M.S.O. (11.)	Maude, Hon. Francis	Capt. R.N. (11.)
*McMahon, C. J.	Lt.-Col. R.A. (11.)	Maude, F. F., O.C. CB.	Maj.-Gen. (11.)
M'Murdo, W. M., S., CB.	Lieut-Gen. (11.)	Maude, F. N.	Lieut. R.E. (11.)
McMullin, J.	Capt. Mad. S. Corps (11.)	Maude, G. A., CB.	Lieut.-Col. (ret.) R.H.A.
McNair, J. A. Fred.	Major R.A. (11.)	Maunsell, D. Chas.	Capt. R. E. Mid. Mil. (11.)
Macneill, J. G. B. D.	Capt. Mad. S. C. (11.)	Maunsell, F. R., CB.	Col. R.E. (11.)
McPherson, Cecil	Major 17th Regt. (11.)	Maurice, J. F.	Capt. R.A. (11.)
Macpherson, J. C.	Capt. R.E. (11.)	Maw, James	Capt. 3rd Essex Art. Vols. (11.)
Macpherson, J. F.	Capt. Border Rifles (11.)	Mawson, W. Willmott	Lt.-Col. 33rd Lanc. R.V. (11.)
Macqueen, D. R.	Capt. 75th Regt. (11.)	Maxse, Fred. A.	Rear-Adm.
Madden, Geo. C.	Lieut. 1st W. I. Regt. (11.)	Maxse, H. F. B.	Lt.-Col. late Cold. Gds.
*Maillard, R. T.	Capt. 16th Lancers (11.)	Maxwell, H. H., CB.	Maj.-Gen. R.A. (11.)
Main, Robt., Esq.	Royal Naval College (11.)	Maxwell, R. J.	Major (h.p.) 80th Regt. (11.)
Mainguy, F. B.	Major R.E. (11.)	Maxwell, W. H.	Capt. R.N. (11.)
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Maitland, G. G. W., FRCS.	D.S. Gen. (11.)	Mayers, J. P.	Col. late 86th Regt. (11.)
Maitland, H. L.	Capt. R.N. (11.)	Mayne, J. O.	Lieut.-Col. R.E. (11.)
Malet, C. St. Lo. Lt.-Col. late S. F. Gds.	(11.)	Mayne, J. T. B.	Capt. 73rd Regt. (11.)
Malet, H. C. E. Lt.-Col. (ret.) Gr. Gds.	(11.)	Mayo, John H. late	Lt. W. Norfolk Mil. (11.)
Malet, Harold E.	Capt. 18th Hussars (11.)	Mayo, W. R.	Asst. Commissary (11.)
Malgارين, F. L.	Lt. Forfar and Kincardine Art. Mil. (11.)	Meade, H. R.	Major R.E. (11.)
Majendie, V. D.	Major R.A. (11.)	Medwin, Frederick	late R.N. (11.)
Malcolm, G. A., CB.	Lieut.-Gen. Col.	Meehan, Geo. Waller	Lieut.-Col.
105th Madras L. I. (11.)		Melgund, G. J. Viscount	Lt. (ret.) S.F. Gds. (11.)
Malcolm, G. J.	Capt. R.N. (11.)	Mellor, A.	Lieut. (ret.) 8th or King's (11.)
Malden, Viscount	Lt.-Col. Herts Yeo. (11.)	Melville, P. Lawrence	Lt. 97th Regt. (11.)
Malley, James	Lieut. (ret.) 53rd Regt. (11.)	Melville, Teign	Lieut. 24th Regt. (11.)
Maltby, J. M.	Lieut. 1st W. I. Regt. (11.)	Mends, Geo. C.	Rear-Adm.
*Malthus, Sydenham	Major 94th Regt. (11.)	Mends, Herbert	Col. (ret.) 2nd W. I. R.
Malton, W. D.	Capt. late Scottish Borderers Mil. (11.)	Mends, Sir W. R., KCB.	Vice-Adm. (11.)
Manby, Charles, FRs.	Lt.-Col. Eng. and Railway Vol. Staff Corps (11.)	Merrewether, Sir W. L., CB.	KCSI. Col. (11.)
Manderson, G. R.	Major R. H. A. (11.)	Merron, J. E.	Lieut. R.N. (11.)
Mansell, A. B.	Lieut. R.N. (11.)	Mesham, Arthur	Capt. 1st 1st R. Drs. (11.)
Manson, A. B.	Maj.-Gen. (11.)	Messervy, Geo. T.	Capt. 21st Middlesex R.V. (11.)
Manson, Walter	Capt. R.E. (11.)	Metcalfe, John A.	Capt. 1st Durham Mil. (11.)
March, W. H., CB.	Maj.-Gen. (ret.) R.M.L.I.	Methuen, F. H. P. Lord	Col. R. Wilts Mil. ADC. to the Queen
Margesson, W. G.	Lt.-Col. (11.)	Methuen, Hon. Paul S.	Lt.-Col. S. F. Gds. (11.)
Marindin, H. R.	Maj. late 1st Royals (11.)	Meurant, Edwd.	Lt.-Col. 83rd Regt. (11.)
Markham, W. T.	Capt. late Cold. Gds.	Meyrick, Aug. W. H.	Col. late Sco. Fus. Gds.
Marquis, Jas.	Col. 17th Ben. N. I. (11.)	Michell, Sir John, GCB.	Lt.-Gen. Col. 86th Regt. (11.)
Marriott, C. F.	Capt. 6th Dr. Gds. (11.)	Michel, J. Edward, CB.	Col. R.H.A. (11.)
Marriott, H. C. Maj.	(ret.) 60th Rifles (11.)	Michalowski, F. H.	Capt. Georgetown Art. Mil. (11.)
Marriott, W. F., CSI.	Maj.-Gen. (unatt.) (11.)	Middleton, F. D.	Col. (11.)
Marriott, W. H.	Capt. 11th Regt. (11.)	Middleton, Sir G. N. Broke, Bart., CB.	Vice-Adm. (11.)
Marryat, J. H.	Capt. R.N.	Middleton, O. R.	Capt. 4th King's Own (11.)
Marsden, Richard	Capt. R.N.R. (11.)		
*Marsden, William	Capt. 82nd Regt. (11.)		
Marshall, John. W.	Capt. Martin Rifle V. N.Z. (11.)		
Marham, H. S.	Lieut. 60th Rifles (11.)		
Marsh, W. D.	Lieut.-Col. R.E. (11.)		

- Midmay, H. P. St. J. Lieut. Gren. Guards (11.)
 *Midmay, Sir Henry B. P. St. John, Bart. Lt.-Col. Hants Yeo. (11.)
 *Midmay, H. A. St. J. Capt. Rifle Brigade (11.)
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 Miles, Thos. G. Major N. Durham Mil. (11.)
 Miller, D. S. Lt.-Col. (11.)
 Miller, D. Capt. R.N. (11.)
 Miller, G. M., CB. Lt.-Col. 79th Highls. (11.)
 Miller, H. M. Capt. R.N. (11.)
 Miller, T. C. Capt. 43rd Regt. (11.)
 Miller, Thos. E. Lieut. R. N. (11.)
 Milligan, Charles Major late 39th Reg. (11.)
 Millington, Walter Capt. late 3rd Essex Art. Vols. (11.)
 Mills, C. J. C. Maj.-General
 *Milman, G. A. Lt.-Col. (h.p.) R.A. (11.)
 Milne, Sir Alex., Bart., GCB. Admiral (11.)
 Milne, H. Maj.-General (11.)
 Milner, Joseph Mid. R.N. (11.)
 Minchin, J. W. Capt. Paymstr. 58th Regt. (11.)
 Mitchell, C. B. H. Major R.M.L.I. (11.)
 Mitchell, C. J. Capt. late Vict. Rifles (11.)
 Mitchell, Hugh H. Capt. Rifle Brig. (11.)
 Mitford, John Lt. Civil Service R.V. (11.)
 Moffatt, K. M. Col. (11.)
 Molony, C. M. Capt. R.A. (11.)
 Molynaux, W. C. F. Lt. 22nd Regt. (11.)
 *Moncrieff, Alex., FRS. Maj. Edin. Art. Mil. (11.)
 *Moncrieff, Geo. H. Lt.-Col. S. F. Gds. (11.)
 *Moncrieff, L. N. Comr. R.N. (11.)
 Money, E. C. Capt. 87th Fus. (11.)
 *Mason, Hon. D. J. Capt. (ret.) 96th Regt.
 Montagu, Andw. Lt. 5th W. York Mil. (11.)
 Montgomery, G. S., CSI. Maj.-Gen.
 Montgomery, W. E. Capt. S. F. Gds. (11.)
 Montzambert, C. E. Maj. Canadian Art. (11.)
 Montresor, H. E. Lt.-Col. (ret.) Gr. Gds.
 Moody, J. L., M.A. late Chap. to the Forces (11.)
 Moore, Arthur W. Lieut. R.N. (11.)
 *Moore, A. G. Montgomery Col. 4th Huss.
 Moore, H., CB. Lt.-Col.
 Moore, H. C. Lieut. R.E. (11.)
 *More, John C. Capt. late Rifle Brigade (11.)
 More, R. C., CB. Lt.-Gen. R.A. (11.)
 *More, Thomas C. O. Maj.-Gen. R.M.L.I.
 *Mort, W. S. Capt. late Gr. Gds. (11.)
 *Moss, H. E. H. Drummond Capt. S. F. Gds.
 *Murray, J. C. D. S. Major 28th Bo. N.I. (11.)
 *Mre. George Lt. 3rd Essex Art. V. (11.)
 *Morgan, G. B. Maj. Town Maj. Gibraltar (11.)
 *Morgan, Horatio Maj. Paym. 100th Reg. (11.)
 *Morgan, J. P. Major R.A. (11.)
 *Moss, James A. Major (ret.) R.M.L.I. (11.)
 *Mott, H. Capt. late Essex Rifles (11.)
 *Morrison, J. Lieut.-Col. (11.)
 *Morrison, R. Col. (11.)
 *Moria, Mark Naval Instructor (11.)
 *Morrison, W. L. Col. R.E. (11.)
 *Moss, H. B. Dep. Com.-General (11.)
 *Moss, A. A. Lieut. 24th Regt. (11.)
 *Morrison, Stanley Capt. late 60th Rifles (11.)
 *Mortlock, Wm. Ens. Vict. R.V. (11.)
 *Morton, G. de O. Lieut. 6th Regt.
 Mostyn, Hon. M. late Paym. 21st R.N.B. Fus.
 Mostyn, Hon. Roger Lt.-Col. (ret.) S. F. Gds.
 Mount-Charles, G. H. EARL of Col. (h.p.) 1st L. Gds.
 Mountstevens, F. H. Capt. (h.p.) R.M.L.I. (11.)
 Moysey, Charles John Capt. R.E. (11.)
 Muir, Sir W. Muir, KCB. Director-Gen. Army Medical Department (11.)
 Muncaster, Lord, Capt. late R. Brig. MP. (11.)
 Mundy, A. M. Capt. late Notts. Mil. (11.)
 Mundy, Sir G. Rodney, KCB. Adm. (11.)
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 Munro, C. A. Capt. Bengal Staff Corps (11.)
 Murchison, K. R., formerly of the 13th and 58th Regts. and late Capt. Som. Yeo. (11.)
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 Murphy, J. A. Lieut. 82nd Regt. (11.)
 Murray, A. M. Lieut. R.A. (11.)
 Murray, John Lt.-Col. late Gr. Gds. (11.)
 Murray, J. J. Col. Ben. S.C. (11.)
 Murray, K. D. Capt. 89th Regt. (11.)
 Murtoigh, John Surg. (h.p.)
 Mussenden, W. Lt.-Col. 8th Hussars (11.)
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 Nelson, W. F. Capt. R.A. (11.)
 Nesham, T. P. W. Lieut. R.N. (11.)
 Nettleship, W. F. Capt. 9th Surrey R.V. (11.)
 Neville, Edward Lt.-Col. (ret.) S. F. Gds.
 Newall, D. J. F. Col. R.A. (11.)
 Newdigate, Edw. Col. (11.)
 Newdigate, H. R. L. Lt.-Col. Rifle Brig. (11.)
 Newington, Cecil G. H. Lieut. 31st Regt. (11.)
 Newton, C. M. H. Capt. 22nd Regt. (11.)
 Newton, W. E. Lt. late 1st Mid. Eng. V. (11.)
 Newton, W. S. Lieut.-Gen.
 Nicholls, G. Lieut.-Col. 27th Ro. N.I. (11.)
 Nicholls, Henry Maj. (ret.) 94th Regt.
 *Nicholson, Henry F. Capt. R.N. (11.)
 Nicholson, Lothian, CB. Col. R.E. (11.)
 Nicholson, W. G. Lieut. R.E. (11.)
 Nicholson, S. J. Major R.A. (11.)
 Nicoll, Chas. R. Surg.-Maj. (ret.) Gr. Gds.
 Nicolls, O. H. A. Lt. Col. R.A. (11.)
 Nicolson, Sir Fred. W. E., Bart., CB. Admiral (11.)
 *Nicolson, Frederick Lieut. R.H.A. (11.)
 Noble, Andrew Capt. late R.A. (11.)
 Nolan, J. Philp Capt. R.A., MP. (11.)
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 Norbury, T. C. N. Col. late 6th Dr. Gds.
 *Norcock, Charles J. Lieut. R.N. (11.)
 Norcop, W. J. Lieut. R.N. (11.)
 Norcott, Wm. S. R., CB. Major-Gen. (11.)
 Norman, C. B. Capt. late B. S. (11.)
 Norman, Henry Lieut. late 10th
 Norman, Sir H. W., KCB. Major
 *Norris, G. G. Capt. 2nd Warwick

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 *Northumberland, The Duke of Lt.-Col. North. Mil.
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 Nott, A. H. Capt. late I. N.
 Nugent, Andrew Col. 2nd R.N.B. Drs. (11.)
 Nugent, C. B. P. N. H., CB. Col. R.E. (11.)
 Nugent, C. E. Lieut. late 43rd L.I.
 Nugent, Sir G. E., *Bart.* Lt.-Col. late Gr. Gds. (11.)
 Nugent, St. G. M. Col. (11.)
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 O'Hea, J. B. Capt. late 25th K. O. Bor. (11.)
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 Oldfield, Geo. T. Capt. Rl. Lon. Mil. (11.)
 *Oldfield, Richd. Major R.A. (11.)
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 Ord, Sir H. St. G., *Kt.*, CB. Maj.-Gen. R.E.
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 *Osborne, Eric W. Lt. late 1st W. I. Regt. (11.)
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 Otway, W. P. Capt. Cold. Gds.
 Ouchterlony, T. H. Capt. R.A. (11.)
 Outram, A. M. Lt. Rl. Sher. For. Mil. (11.)
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 Owen, F. H. E. Capt. R.M.A. (11.)
 *Owen, G. A. Capt. late 107th Regt. (11.)
 Owen, B. E. Lieut. 69th Regt. (11.)
 Oxley, J. S. Lt.-Col. 19th Middx. R.V. (11.)
- PADDISON, H. Lieut. 43rd Middx. R.V. (11.)
 Page, G. H. Col. 47th Depôt Brig. (11.)
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 Palk, Lawrence H. Lieut. 1st Devon Yeo. late Lieut. S. F. Gds. (11.)
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- Palmer, Frederick Lieut.-Col. S. F. Gds.
 Palmer, John Capt. R.N. (11.)
 Palmer, Sir R., *Bt.* Col. (ret.) 2nd L. Gds.
 Pamphilon, F. W. Lt. 2nd S. Mid. R. V. (11.)
 *Panter, H. G. Major 22nd Regt. (11.)
 Pardoe, T. F. Capt. 22nd Regt. (11.)
 *Parish, H. Woodbine, CB. Col. late 45th Regt. (11.)
 Parke, Wm., CB. Maj.-General (11. 1s.)
 *Parker, C. W. Maj. late 4th B. Middlx. Mil. and 69th Regt.
 *Parker, F. G. S. Major 54th Regt. (11.)
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 Parker, R. J. H. Capt. R.E. (11.)
 Parkinson, C. F. Lt.-Col. 95th Regt. (11.)
 Parkinson, F. F. Lieut. 17th Regt. (11.)
 Parlbay, Wm. Gen. Col. 21st Hus. (11.)
 Parnell, A. Major, R.E. (11.)
 Parnell, Hon. H. W. Lt. late R.N. (11.)
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 Parratt, J. E. T., MD. I. G. of Hosps.
 Parsons, Clifford Major 3rd Buffs (11.)
 Parsons, Wm. Comm. R.N. (11.)
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 Patterson, David Aikman Major Paym. 21st Fusiliers (11.)
 Patterson, W. T. L. Col. late 88th Regt. (11.)
 Pattison, Rowles Capt. late 40th Middsex. R.V. (11.)
~~Patton, John Lt.-Gen. Col. 47th Regt. (11.)~~
 *Payn, Wm., CB. Maj.-Gen. Unatt. (11.)
 Paynter, John Capt. (ret.) S. F. Gds.
 Peacock, Geo. Master R.N. (11.)
 Pead, Leonard W. Capt. Suffolk Mil. Art. (11.)
 Pearce, Fras. G. Paym. R.N. (11.)
 Pearce, Cosmo B. Capt. late Gren. Gds. (11.)
 Pearce, Geo. G. Lieut.-Col. R.A. (11.)
 *Pearson, C. K. Lieut.-Col. 3rd Buffs (11.)
 Pearson, M. B. Capt. 2nd Mid. Art. V. (11.)
 Pearson, B. L. O. Col. (ret.) Gr. Gds.
 Peel, Cecil Lennox Lt.-Col. late S.F. Gds. (11.)
 Peel, *Right Hon.* Jonathan, MP. Lieut.-Gen.
 Peel, J. Floyd Capt. late S. F. Gds.
 Pemberton, R. O. B. Major R.E. (11.)
 Pennant, Hon. A. H. D. Lt.-Col. late Gr. Gds.
 Pennefather, R. Don. Lt.-Col. E. Kent Mil.
 Pennefather, B. P. Capt. R.E. (11.)
 *Pennethorne, L. P. Capt. R.A. (11.)
 Pennington, Edward War Office (11.)
 Penny, Stapleton Major R.A. (11.)
 Penrhyn, Lord E. G. D. Col. Comd. Royal Carnarvon Rifle Corps
 Peplow, D. Peplow Major 1st Heref. R.V. (11.)
 Perceval, Jno. J. Lt. (ret.) 17th Regt. (11.)
 Perceval, Spencer Lieut.-Gen.
 Percy, George A. Capt. Gr. Gds. (11.)
 Percy, Hugh M., Lord, *St. J.*, KCB. Lt.-Gen.
 Perry, Lionel F. Lieut. R.A. (11.)
 Petre, John Barney Capt. late 1st Drs. (11.)
 *Petrie, Martin Lt.-Col. (h.p.) 97th Regt. (11.)
 *Peyton, Francis Col. late 98th Regt. (11.)

Peyton, T. G.	Major Heref. Mil. (11.)	Preston, W. H.	Lieut. 73rd Regt. (11.)
Phayre, R., CB.	Brig.-Gen. Bom. S. C.	Price, Arthur	Paymaster R.N. (11.)
ADC. to the Queen (11.)		Price, Edward, CB.	Maj.-Gen. R.A. (11.)
Philips, Alex.	Capt. R.N. (11.)	Price, G. E.	Comr. R.N., MP. (11.)
Philips, Geo.	Major R.E.	Prichard, A.	Maj.-Gen. (11.)
*Philips, George	Major 4th Hussars (11.)	Prickett, Thos.	Capt. 56th Regt. (11.)
Phillimore, Wm. Brough	Capt. late Gr. Gds.	Prior, H. W.	Lieut. 81st Regt. (11.)
Phillips, Sir B. T.	Maj.-Gen. (11.)	Pritchard, G. D.	Col. R.E. (11.)
Phillips, L. Guy	Lt.-Col. Gr. Gds. (11.)	Probyn, Sir D. M.	Maj.-Gen., <i>£.£.</i> KCSI, CB. (11.)
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Phillips, Paul Winaloe	Col. R.A.	Prowse, J. F.	Comr. R.N. (11.)
Phillipotte, W. C.	Lieut.-Col. R.E.	Puckle, Alfred D.	Capt. Lon. Sc. R.V. (11.)
*Philp, Francis L.	Capt. late 2nd R.N.B. Dra. (11.)	Pugh, Horace, J. M.	Lieut. R.N. (11.)
Philpot, H. J.	Late Surg. Brecon Mil. (11.)	Pullen, W. J. S.	Rear-Adm. (11.)
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Pidcock, Thomas	Paymaster R.N.	Pym, Francis	late Lieut. 1st Life Guards (11.)
Piera, C. B.	Major and Paymaster R.A.	Pym, Samuel	Capt. R.A. (11.)
Pierson, W. Henry	Capt. R.E. (11.)	QUICK, George, Engineer R.N. (11.)	
Pigott, H. de R.	Col. 70th Regt. (11.)	RADCLIFFE, H. Lt.-Col. 39th Middx. R.V. (11.)	
Pilgrim, Chas.	Capt. Bucks Yeo. (11.)	Raddcliffe, R. P.	Col. R.A. (11.)
Pilleau, H. G.	Capt. R.E. (11.)	Raikes, P. B.	Major R.A. (11.)
Pitcher, Duncan G.	Capt. Ben. S. C. (11.)	Raitt, E. R.	War Office (11.)
Playfair, W. M.	Capt. 107th Regt. (11.)	Ralston, W. C.	Capt. late 46th Regt. (11.)
*Plummer, H.	Major 7th R. Fus. (11.)	Ramsay, B. D. W.	Major (11.)
Plunkett, R. H. W.	Lieut. R.A. (11.)	Ramsbotham, John	late Lt. R. Sussex Mil. (11.)
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Pocklington, E. H. F.	Major-Gen.	Randall, Alfred	Capt. 13th L.I. (11.)
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*Pocklington, G. H.	Lt.-Col. late 18th K.I.	Randolph, Edmd.	Lieut. 69th Regt. (11.)
*Pole, C. V. N.	Lt.-Col. late Cape M.R. (11.)	*Randolph, G. G., CB.	Rear-Adm. (11. 10s.)
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Ponsonby, Hon. A. J. G.	Capt. late Gr. Gds.	*Rawlins, John	Major 48th Regt. (11.)
*Pooley, H.	Capt. 3rd Ches. Art. V. (11.)	Ray, A. E.	Maj. 3rd Mid. Art. V. (11.)
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Pope, W. Agnew	late Lt. 1st Beng. F. (11.)	Read, Constantine	Lt.-Col. (h.p.) R.S.C. (11.)
Popham, Brunswick	Adm. (11.)	Read, O. O.	Surg. Cold. Gds.
Porter, Whitworth	Col. R.E. (11.)	Read, John M.	Capt. late 13th L. Inf. (11.)
Porteous, David Scott	Lt. 2nd R.N.B. Dra. (11.)	Read, Philip	Capt. 19th Middx. R.V. (11.)
Porteous, F. P.	Lieut. 24th Regt. (11.)	Reade, C. E.	Comr. R.N. (11.)
*Portman, Hon. W. H. B.	Col. late West Som. Yeo. MP. (11.)	Ready, C.	Lt.-Col. (ret.) 55th Regt. (11.)
Pote, C. St. Clair	Capt. 4th Regt. (11.)	*Ready John T.	Capt. 66th Regt. (11.)
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Powell, R. A., OB.	Rear-Adm.	Reece, Fredk. L. O.	Lieut. R.N. (11.)
Powell, Thomas H.	Capt. late S. F. Gds.	Reed, Sir T., GCB.	Gen. Col. 44th Regt. (11.)
Power, Sir W. T. J., KCB.	Com. G.-in-Chief	Reeve, Ellis P. F.	Lt.-Col. late Cold. Gds. (11.)
Powys, Hon. Charles J. Fox	Maj. 69th Regt	Reid, A. T.	Major Bombay S. C. (11.)
Powys-Keck, H. L.	Lt. Leicester Yeo. (11.)	Reid, D.	Lieut.-Col.
Powys-Keck, T. B.	late Lt. 60th Rifles (11.)	Reid, P. Savile G.	Lieut. R.E. (11.)
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Prescott, A. S. K.	Surg. Major R.A. (11.)	Benny, Henry, CSI.	
Preston, A. T.	Lieut. R.E. (11.)		
Preston, B. H.	Major M.S.C. (11.)		
Preston, F. W. H.	Lt. 49th Middlesex Rifle Volunteers (11.)		

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 Reynardson, O. B. Lt.-Col. Gr. Gds. (11.)
 Ricardo, Horace Capt. Gr. Gds.
 Richards, W. H. late Lieut. R.N. (11.)
 Richardson, J. S. Lt.-Col. N.S.W. Local Forces (11.)
 Richardson, W., CB. M.-Gen. late Indian Army (11.)
 Richmond, H. T. Lt.-Col. S.O.P. (11.)
 Rickards, A. W. L. Lt. 1st R. Scots Regt. (11.)
 Ricketts, Geo. T. late Lt. 5th Dr. Gds. (11.)
 *Riddell, H. S. Hutton Lt. 60th Rifles (11.)
 Ridgway, Alex. Maj. late 1st Devon Mil. (11.)
 Ridgway, T. G. Army Agent (11.)
 Ripley, Thos. G. F. late Ord. Dep. (11.)
 Ripon, MARQUIS of (11.)
 Roberts, H. O. Dep. Lieut.
 Roberts, C. P. Major R.A.
 Roberts H. B. Col. late R.M.A. (11.)
 Roberts, Wm. Col. 5th Fusiliers (11.)
 Robertson, Rev. Arch. late 51st Regt. (11.)
 Robertson, D. Maj. 44th Mad.N.I. (11.)
 Robertson, Murray Capt. W. Kent M. (11.)
 Robertson, E. S. Capt. Beng. S.C. (11.)
 Robertson, W. John Lieut. R.A. (11.)
 Robertson, W. Lt.-Col. late 1st R. E. Mid. Mil.
 Robertson, W. Maj. Mad. S. C. (11.)
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 *Robinson, G. C. Maj. late 17th Lanc. (11.)
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 Robinson, Sir Hercules G.R. Kt. (11.)
 Robinson, Henry Capt. R. E. (11.)
 Rochford, J. D. Capt. late R. Lanc. R. (11.)
 Rodd, John R. Capt. R.N. (11.)
 *Roe, E. M. Capt. 23rd R. W. Fus. (11.)
 Roe, Herbert F. Paymaster, R.N. (11.)
 Roe, W. C. Staff Surgeon (11.)
 *Rogers, E. Capt. S.O.P. (11.)
 *Rogers, J. E. V. Capt. 102nd R. M. Fus.
 Rokeyby, H. Lord, GCB. Gen. Col. 77th Regt. (11.)
 Rollo, How. B., CB. Major-Gen. (11.)
 Rolfe, H. J. Lt. 3rd Middlx. Art. V. (11.)
 Romer, R. Frank Gen. R.A.
 Romilly, F. W. Lt. Scots Fus. Gds. (11.)
 Romney, EARL of late Lt. E. Kent Yeo. (11.)
 Rooper, O. J. T. Major Flint Mil. (11.)
 Rose, Henry Comr. R.N. (11.)
 Rose, H. Cooper, MD. Surg. Royal East Middlesex Militia (11.)
 Rose, W. M. Ens. (ret.) 32nd Regt. (11.)
 Ross, Albert E. Maj. 5th Fus. (11.)
 Ross, J. C. Capt. B.E. (11.)
 Ross, John, CB. Brig.-Gen. late Rifle Brig. (11.)
 Ross, W. H. Maj. Bombay S. C.
 Ross of Bladensburg, J. F. G. Lieut. Cold. Gds. ~~Sole Metallist, Military Essay~~, 1877 (11.)
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 Rotton, Arthur Lieut.-Col. late R.A. (11.)
 *Roupeil, C. M. Capt. Inns of Court R.V. (11.)
 *Rouse, Rolla Major late Suffolk R.V. (11.)
 Rowe, Samuel, CMG. MB. Surg.-Maj. (11.)
 Rowley, O. J. Capt. R.N. (11.)
 Rowsell, E. P. late Capt. Lon. B.V. (11.)
 Ruddell, J. A. Col. 25th K. O. Borders.
 Ruddiman, T. Capt. (ret.) M. Army (11.)
 Rumley, Randal Lieut.-General (11.)
 Rushout, Sir C. F. R., Bart. Capt. (ret.) R. H. Gds.
 Russell, Cecil H. Maj. Inns of Court R.V. (11.)
 Russell, Sir Charles, Bart., W.C. Lt.-Col. (ret.) Gr. Gds. MP.
 Russell, Lord Chas. Jas. Fox Lt.-Col. late 60th Rifles
 Russell, Christopher J. Capt. R.E. (11.)
 Russell, Charles R. T. Comr. R.N. (11.)
 Russell, Sir D., KCB. Lieut.-Gen. (11.)
 Russell, Lord Edward, CB. Adm.
 Russell, Godfrey Maj. late Shropshire Mil. (11.)
 Russell, Hon. Geo. W. G. late Lt. 9th Lan. (11.)
 *Russell, J. C. Maj. 12th R. Lancers (11.)
 *Rutley, J. L. Capt. 2nd Mid. Art. V. (11.)
 Rycroft, C. A. W. Lieut. Hants Yeo.
 Rycroft, Sir N., Bart. Capt. Hants Mil. (11.)
 Ryder, Alfred P. Vice-Adm. (11.)
 Ryley, Frank Lieut. 81st Regt. (11.)
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 Gen. Col. Comm't. R.A. (11.)
 Sadler, S. W. Paymr.-in-Chief R.N. (11.)
 Sainsbury, C. H. S. Capt. late 91st Regt. (11.)
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 St. George, Sir J., KCB. Lt.-Gen. R.A. (11.)
 St. John E. B. Capt. (h.p.) 73rd Regt. (11.)
 Salis-Schwabe, Geo. Capt. 6th Dr. Gds. (11.)
 Salmon, Nowell, W.C. CB. Capt. R.N. (11.)
 Salmond, Wm. Capt. R.E. (11.)
 Saltoun, Alex. Lord Lt.-Col. late Comm't. Aberdeen Mil. (11.)
 *Salisbury, Fred. O., CB. Maj.-Gen. (11.)
 Salway, Alfred Dep. Com.-General
 Samson, A. M. W. Major late 1st W.I. Regt. (11.)
 Sandhurst, W., Lord Lieut. Cold. Gds. (11.)
 Sandilands, Philip H. Major R.A. (11.)
 Sands, W. H. Capt. 6th W. Y. Mil. (11.)
 *Sandwith, J. H. Lt. R.M.L.I. (11.)
 Sandys, Edwin W. Capt. R.A., Adj't. Forfar and Kincardine Mil. (11.)
 Sankey, M. H. P. R. Lieut. R.E. (11.)
 Sankey, Wm., CB. Maj.-Gen. (11.)
 Sargent, J. N., CB. Col. (h.p.) 3rd Buffs (11.)
 Sartorius, Sir George Rose, KCB. Ad-miral of the Fleet (11.)
 Sartorius, E. H. Capt. 59th Regt.
 Sartorius, G. C. Capt. Ben. S. O.
 Sartorius, R. W., W.C. CMG. Maj. 6th Bengal Cav.
 Satterthwaite, B. A. Lieut. 81st Regt. (11.)
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 Saurin, E. Admiral (11.)
 Savile, Albany E. Capt. 18th B. I. (11.)
 Savory, H. B. Capt. (h.p.) 78th Highlrs. Adj't. Roy. Lon. Mil. (11.)
 Sawyer, C. Col. late 6th Dr. Gds. (11.)
 Sawyer, G. W. Capt. Bomb. S. C.

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 Sayer, J. R. S., CB. Col. late 3rd Drag. Gds. (11.)
 Scarlett, Leopold J. Y. C. Capt. S. F. Gds. (11.)
 Schaw, H. Lt.-Col. R.E.
 Schomberg, G. A., CB. Lieut.-Gen. (11.)
 Sconce, G. C. Lieut. late I. N. (11.)
 Scot, P. G. Col. 36th Bengal N.I. (11.)
 Scott, A. de C. Major R.E. (11.)
 Scott, Hon. Chas. Grantham late Col. S. F. Gds.
 Scott, C. H. S. Major Beng. S.C. (11.)
 Scott, *Right Hon.* LORD Charles T. M. D. Capt. R.N. (11.)
 Scott-Douglas, J. H. Lt. 21st Royal North British Fusiliers (11.)
 Scott, E. W. S. Major-Gen. R.A. (11.)
 Scott, F. D. Sibbald Lieut. R.N. (11.)
 Scott, Geo. T. Capt. 2nd R.N.B.Drs. (11.)
 Scott, H. B. late Lt.-Col. (h.p.) 9th Regt. (11.)
 Scott, Hen. Young D. Maj.-Gen. (ret.) R.E.
 Scott, R. A. E. Capt. R.N. (11.)
 Scott, Sir Sibbald David, *Bart.* Capt. late R. Sussex Mil. Art. (11.)
 Scott, T. A. Capt. Beng. S.C. (11.)
 Scott, William Capt. late 1st R. Drs. (11.)
 Scott, W. C. E. Capt. late 100th Regt. (11.)
 Scourfield, J. A. P. Capt. 12th B. Lan. (11.)
 Scovell, E. W. Col. late 96th Regt.
 Scriven, A. G. Lieut. 52nd Reg. (11.)
 Scriven, Horace W. Maj. 4th Middx. Mil., Capt. late 25th K. O. Borders.
 Seafield, J. C., EARL of late R.N.
 Seaman, W. C., MD. D.I.G. of Hosps. (11.)
 Seacombe, John Rear-Admiral (11.)
 Seddon, H. C. Major R.E. (11.)
 Sedgwick, Leonard Lt. R. Flint Mil. (11.)
 Sefton, W. P., EARL of late Capt. Gr. Gds. (21.)
 Selwyn, Jasper H. Rear-Adm. (11.)
 Seton, J. L. Capt. (ret.) 102nd L.I. (11.)
 Seton, W. C. Capt. (ret.) 82nd Regt. (11.)
 Sewell, J. H. Lieut. 15th Hussars (11.)
 *Sewell, T. D. Capt. R. Lond. Mil. (11.)
 Sexton, M. J. Capt. R.A. (11.)
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 *Seymour, F. Beauchamp P., CB. Vice-Adm.
 Seymour, F. H. A. Major Rifle Brigade
 Seymour, Leopold R. Lt.-Col. late Gr. Gds. (11.)
 Seymour, LORD W. F. E. Lieut.-Col. Cold. Gds. (11.)
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 Shaw, William Capt. 2nd Stafford Mil. (11.)
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 Sherson, Alex. Nowell Capt. (11.)
 Shervinton, C. R. Lieut.-Col. (11.)
 Shirley, James C. Capt. 100th Regt. (11.)
 Shirley, Sir Horatio, KCB. Lieut.-Gen. (11.)
 Shuckburgh, Sir G. T. Francis, *Bart.* Maj. late S. F. Gds.
 Shute, C. C., CB. Major-Gen. MP. (11.)
 Shute, Neville H. Col. late 64th Regt. (11.)
 Siborne, H. T. Lt.-Col. R.E. (11.)
 Sibthorp, C. C. W. Capt. late 1st Drs.
 Sich, Arthur J. Capt. 2nd Middx. R.V. (11.)
 Silk, Geo. C. Lieut. late S. Middx. R.V. (11.)
 Sillery, Charles Col. (ret.) 30th Regt. (11.)
 Silver, Hugh A. Lt.-Col. 9th Essex R.V. (11.)
 Sim, C. A. Capt. R. E. (11.)
 Sim, E. C. Major R.E. (11.)
 Simkins, J. G. Lt. 2nd Middx. Mil. (11.)
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 Simpson, D. Lieut.-Gen. Beng. Army (11.)
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 Simpson, G. W. Y. Maj.-Gen. R.A. (11.)
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 Sinclair, the Hon. the Master of Col. late 57th Regt. (11.)
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 Singleton, John Maj.-Gen.
 *Sitwell, H. C. Capt. 91st High. (11.)
 Sitwell, H. S. Capt. R.E.
 Skinner, P. K. M., CB Lieut.-Gen. (11.)
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 Skinner, Thos. Major late Ceylon Rifles (11.)
 Skipton, S. S. MD. Surg. 25th Regt.
 *Skrine, H. Capt. 48rd Middx. R.V. (11.)
 Skrine, H. M. Maj. Som. Rifle Vols. (11.)
 Slack, James Lt.-Adj. Sc. of Musk. (11.)
 Slade, Charles G. Major Rifle Brig. (11.)
 Sladen, Joseph Capt. (11.)
 Slingsby, T. Capt. (ret.) R. H. Gds. (11.)
 Sloggett, W. H. D.I. Gen. of Hospitals and Fleets (11.)
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 Smith, C. B. Lucie Maj. Mad. S.C. (11.)
 Smith, Carlton Maj. 1st R. Surrey Mil. (11.)
 Smith, Edwd. Capt. 40th Middx. R.V. (11.)
 Smith, Edwd. L. Capt. N. Durham Mil. (11.)
 Smith, Felix V. Capt. late 2nd Dr. Gds.
 Smith, Gerard Lieut.-Col. late S.F. Gds. (11.)
 Smith, H. Fowle, MD. D. Surg. Gen. (11.)
 Smith, Hy. Porter Lt. (h.p.) Rifle Brig. (11.)
 Smith, James Webber, CB. Lieut.-Gen.
 Smith, Jervoise Major late R. Edmonton Rifles
 Smith, Joshua Simmonds Maj.-Gen. (11.)
 Smith, J. H. Col. R.E. (11.)
 Smith, M. W., CB. Lt.-Gen. Col. 20th Hus. (11.)
 *Smith, Percy G. L. Major R.E. (11.)
 Smith, P. H. Lieut. 11th Regt. (11.)
 Smith, Rob. M. Major R.E. (11.)
 Smith, Thomas Charlton Lt.-Gen. (11.)
 Smith, W. Major R.A. (11.)
 Smith, Wm. Lea Lt. (h.p.) 18th L.I. (11.)
 Smith, W. Sidney Adv.
 Smyth, E. G. Selby Lieut. 86th Reg. (11.)
 Smyth, E. Selby Maj.-Gen. (11.)
 Smyth, G. J. F. Lt.-Col. C
 Smyth, Henry, CB. I

Smyth, Henry Augustus	Col. R.A. (11.)	Stewart, John D. H.	Capt. 11th Hus. (11.)
Smyth, H. F.	Capt. R.A. (11.)	Stewart, J. H.	Col. R.M.L.I. (11.)
Smyth, J. H., CB.	Maj.-General R.A. (11.)	Stewart, Hon. R. H.	Capt. (h.p.) 42nd High. (11.)
Smyth, James S.	Capt. 17th Regt.	Stewart, R. McG.	Capt. R.A. (11.)
Smythe, Wm. Jas., R.A. FRS. MRIA.	Maj.-Gen.	Stewart, R. C.	Col. (h.p.) 2nd Regt.
Somerset, Edw. A., CB.	Col.	Stewart, Hon. Walter J.	Capt. 12th R. Lanc. (11.)
Sondes, G. W. Lond.	Lieut.-Col. East Kent Yeo.	Stewart, W. Houston, CB.	Rear-Adm. (11.)
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Sparks, E. T. B.	Lieut. 98th Regt. (11.)	Stirling, J. S.	Lieut.-Col. R.A. (11.)
Sparks, R. W.	Major 7th R. F. (11.)	*Stirling, W.	Lieut.-Col. R.A. (11.)
Sparshott, A. E.	Lieut. R.M.L.I. (11.)	Stock, H. J.	Capt. Bom. S.O. (11.)
Spearman, H. B.	Capt. Beng. S.C. (11.)	*Stock, M. E. C.	Major R.A. (11.)
*Spencer, Hon. J. W. S.	Rear-Adm.	Stoddard, Thomas H.	M.-General (11.)
Spencer, Hon. R. C. H.	Col. (ret.) R.A.	Stoker, W. Beauchamp	Capt. 2nd W.I. Regt. (11.)
Spencer, R. H.	Lieut. 2nd Drag. Gds. (11.)	Stokes, Alfred	Capt. late 38th Regt. (11.)
Spencer-Stanhope, F. W.	Lt. 13th Regt. (11.)	*Stone, Cecil P.	Capt. 16th Regt. (11.)
Spicer, R. W.	Capt. late 16th Lancers	Stone, George H.	Lieut.-Col. R.A. (11.)
Spragge, F. P.	Lieut. R.E. (11.)	*Stoney, F. S.	Major R.A.
Sprot, John	Col. (h.p.) 91st Highlrs. (11.)	Stopford, Horace R.	Lieut. Cold. Gds. (11.)
Stacey, W. J.	War Office (11.)	Stopford, Richard H.	Vice-Adm. (11.)
Stafford, P. P. Leslie	Major M. S.O.	Storer, Arthur T.	Major R.E. (11.)
Stair, J. EARL of Capt. late S. F. Gds. (11.)		Stourton, Marmaduke	Capt. 63rd Regt.
Stallard, Wm. Major 1st Worc. Art. V. (11.)		Stracey, Henry H. D.	Lt.-Col. S. F. Gds.
Stanhope, Philip S. Gen. Col. 13th L.I. (11.)		Strahan, William	Major R.A. (11.)
*Stanhope, Walter T. S.,	Capt. 1st W. York Yeo. MP. (11.)	*Strange, Tom Bland	Lt.-Col. R.A.
Stanley, C. E. H.	Lt.-Col. Gr. Gds. (11.)	Strangways, W. A. F.	Lt.-Col. R.A.
Stanley, Edw.	Lieut. 2nd W.I. Regt. (11.)	Strathmore, EARL of	Lt. late 2nd L. Gds.
Stanley, F. S.	Lt. Hants Yeo. late R. H. Gds. (11.)	Strickland, Edw., CB.	Dep. Com. Gen. (11.)
Stanley, Hon. Fred. A.	Lt.-Col. 1st Lanc. Mil. late Capt. Gr. Gds. MP. (11.)	Stuart, Charles	Gen. Col. 46th Regt. (11.)
Stanley, Hans Sloane	Lt. (ret.) 16th Lancers (11.)	Stuart, Geo. B., MB.	Surg. Army Med. Dep. (11.)
Stanley, Hon. J. C.	Lt.-Col. (ret.) Gr. Gds. (11.)	Stuart, J. F. D. Crichton	Lt.-Col. (ret.) Gr. Gds. MP. (11.)
Stapleton, F. G.	Capt. (ret.) 33rd Regt.	Stuart, Wm. Jas.	Lt.-Col. R.E. (11.)
Stapleton, Hon. Miles	Capt. Cold. Gds. (11.)	Stuart, W. T.	Capt. Beng. S.O. (11.)
Stapylton, G. G. O.	Col. (h.p.) 32nd L.I. (11.)	Stucley-Stucley, Sir George, Bart.	Lieut.-Col. late Devon Mil. Art. (11.)
Staunton, Geo., CB.	Lieut.-Gen. Col. 92nd Highlrs.	Studd, Edward	Major-Gen.
Statham, H.	Major 33rd Lanc. R.V. (11.)	Studdert, R. A. FitzGerald	Capt. Lond. Art. V. (11.)
Staveley, Edmund	Major R.A. (11.)	Sturt, O. N.	Col. late Gr. Gds. MP. (11.)
Stawell, Geo. D.	Lieut. 11th Regt. (11.)	Sturt, N. G.	Capt. R.E. (11.)
*Stawell, W. St. L. Alcock	Lt.-Col. N. Cork Rifles (11.)	Sullivan, G. L.	Capt. R.N. (11.)
Stebbing, F. A.	Capt. (h.p.) 8th Regt. (11.)	Sullivan, G. A. F.	Col. (ret.) 5th R. I. Lan.
Steele, Aug. F.	Col. (11.)	Suttie, James Grant	Lt.-Col. Haddington Mil. Art. (11.)
Steele, Sir T. Montague, KCB.	Lt.-Gen. (11.)	Swaine, L. V.	Capt. Rifle Brig. (11.)
Steevens, N.	Lieut.-Col. (11.)	Swann, Jno. S.	Capt. late 22nd Regt. (11.)
Stephen J. Grant	Major R. Lanc. Mil. Art.	Sweny, G. A.	Capt. 7th Fus. (11.)
Stephens, Cecil J. Lt. (ret.) 12th R. Lanc. (11.)		*Swindley, J. E.	Lt.-Col. 15th Hussars (11.)
Stephens, Edmund	Capt. R. E. (11.)	*Swiney, G. Clayton-	Capt. 32nd L.I. (11.)
Stephens, F. S. M. Capt. 2nd R. Middx. Mil.		*Swinfen, F. H. Lt.-Col. (h.p.) 5th Dr. Gds.	
Stephenson, Chas. Capt. 22nd Mid. R.V. (11.)		Symes, W. Alex.	Capt. 71st Highlrs. (11.)
Stephenson, F. C. A., CB.	Maj.-Gen. (11.)	Symonds, C. E. H.	Lieut. late R.A. (11.)
Stepney, Sir John Cowell, Bart., KH.	Lt.-Col. late Cold. Gds. MP. (11.)	Symonds, R. J.	Lieut. R. N. (11.)
Sterling, John B.	Lt.-Col. Cold. Gds. (11.)	Symonds, T. E.	Capt. R.N. (11.)
Stevens, Stephen J.	Lieut. 90th Regt. (11.)	TAAFFE, C. R.	Lieut. 16th Lancers (11.)
Stevens, Wm. Major (h.p.) 2nd or Queen's		Talbot, C. R. M., MP.	Dep. Lieut.
Stevenson, R. A.	Major R.A. (11.)	Talbot-Harvey, W.	Maj. late Suffolk Art. Mil. (11.)
Stevenson, W. G.	Lieut. late S. F. Gds.	Talbot, Hon. R. A. J.	Capt. 1st L. Gds. (11.)
Stewart, Hon. Alex.	Major R. Art. (11.)	Talbot, Hon. W. L.	Lt.-Col. late 21st Fus. (11.)
		Tandy, Dashwood G.	Comr. R.N. (11.)
		Tanner, Edward	Major, 8th or King's

- Tanqueray, C. Waugh Capt. Lon. Scot. R. V. (11.)
 Tate, Jas. Roddam Paym. R.N. (11.)
 Tatham, Edward, C.B. Rear-Adm.
 Tatham, W. I. Lieut. R.A. (11.)
 Tattall, B. C. Capt. R.N. (11.)
 Taylor, Alex., CB. Maj.-Gen. R.E. (11.)
 Taylor, Brook Lt.-Gen. Col. 2nd W. I. Regt.
 Taylor, *The Rev.* H. A., MA. late Chaplain to the Forces
 Taylor, Sir H. G. A., GCB. Gen. (11.)
 Taylor, J. L. du P. Lt.-Col. 40th Middx. R.V. (11.)
 Teasdale, W. Lt. late 1st W. York Art. V.
 Teck, F., *H.S.H. DUKE* of, GOB. Hon. Col. Surrey Art. V. (11.)
 Tempest, Thos. R. P. Col.
 Templer, C. B. Lieut. late I. N. (11.)
 Templeton, J. M. Maj. Victoria R.V. (11.)
 Templetown, Viscount, KCB. Gen.
 Col. Comm. 60th Rifles (11.)
 Tenyson, Julius Capt. late 17th Regt. (11.)
 Terry, A. F. Capt. 60th Rifles (11.)
 *Terry, Frederick S. Major 26th Regt. (11.)
 Terry, H. D. Lieut. 9th Regt. (11.)
 Teschemaker, T. B. Maj. (ret.) R.A. (11.)
 Tew, Cyril B. Capt. 15th Regt. (11.)
 Thackeray, E. T., *W.C.* Major R.E. (11.)
 Thelluson, A. G. B. Major late Cold. Gds.
 Thelwall, E. D. Lt.-Col. late R.M.A. (11.)
 Thesiger, *Hon.* Fred. A., CB. Brig.-Gen. *ADC. to the Queen* (11.)
 *Thesiger, *Hon.* C. W. Col. 6th Drs. (11.)
 Thomas, C. D. Lt.-Col. Cold. Gds. (11.)
 Thomas, H. J. Col. (ret.) R.A. (11.)
 Thomas, J. W., CB. Col. (11.)
 Thomas, Montagu Capt. R.N. (11.)
 *Thomas, Wm. H. Capt. 1st Surrey R.V. (11.)
 Thompson, C. H. Capt. R.A. (11.)
 Thompson, Henry Maj. Ben. S. Corps (11.)
 Thompson, J. C. Capt. 26th Middx. R.V. (11.)
 Thompson, J. H. Lieut. 2nd W. I. Regt. (11.)
 *Thompson, P. S., CB. Col. late 14th Hus. (11.)
 Thompson, W. H. Capt. 1st King's Drag. Gds. (11.)
 Thomson, C. F. Capt. 7th Hus. (11.)
 Thomson, Harry Gen. (11.)
 Thornton, C. E. Major late S.O.P. (11.)
 Thornton, E. Z. Capt. 4th Regt. (11.)
 Thornton, Harry G. Lt.-Col. late Gr. Gds. (11.)
 Thorold, Cecil late Capt. 1st L. Gds. (11.)
 Thuillier, H. L., CSI. Col. R.A. (11.)
 Thurlow, E. H. Lieut. 60th Rifles (11.)
 Thurlow, H. H. Lt. 18th L.I. (11.)
 Thureby, Jas. L. Maj. (ret.) 17th Regt. (11.)
 Thureby, Rich. H. Lt.-Col. late Cold. Gds.
 Thurston, W. French Hon. Asst. Surg. 3rd Middx. Art. Vols. (11.)
 Thynne, Alfred W. Lt.-Col. late Gr. Gds. (11.)
 Thynne, Reginald T. Lt.-Col. Gr. Gds. (11.)
 Tipper, H. Roe Capt. 6th T. Ham. R.V. (11.)
 Tippetts, A. M. Surg. 5th Fus.
 Tipping, Alfred Lt.-Col. late Gr. Gds.
 Tipping, H. T. G. Lieut. R.N. (11.)
 Todd, J. A. Lt.-Col. late 14th Hus. (11.)
 Todd, T. Fentham Capt. 62nd Regt. (11.)
 Toke, J. L. Major 1st Berks R.V. (11.)
 Toler, James O. Lieut. 74th Highs. (11.)
 Tollemache, W. A. Capt. late 2nd L. Gds.
 Tomline, G. Col. N. Lincoln Mil. MP.
 Tomline, Wm. Capt. late 10th Huss. (11.)
 Tompkins, John Paymaster R.N. (11.)
 *Tompson, H. S. Capt. and Adj. 2nd Stafford Mil. (11.)
 *Tompson, W. D. Major 17th Regt. (11.)
 Tongue, J. M. Gurnell Capt. 24th Regt. (11.)
 Torrens, J. A. W. O. N. Lieut. 2nd R.N.B. Dragoons (11.)
 Torriano, C. E. Lt.-Col. R.A. (11.)
 *Tottenham, C. J. Hon. Col. Denbigh Yeo. (11.)
 Tottenham, H. L. A. Maj. 38th Beng. N.I. (11.)
 Toulmin, A. late H.E.I.C.S. (11.)
 Toulmin, Alfred H. late Lt. 65th Regt. (11.)
 Tower, Arthur Lieut. 95th Regt. (11.)
 Townsley, Richard H. late Lt. 2nd L. Gds. (11.)
 Townsend, Samuel P. Capt. R.N. (11.)
 Townshend, H. D. Gen. Col. 25th Regt. (11.)
 Tracy, *Hon.* C. Hanbury late Lt. R.N. MP. (11.)
 Tracey, Harry A. Major R.A. (11.)
 Travers, E. A. Sub-Lieut. 25th Regt. (11.)
 Travers, James, *W.C.* CB. Lieut.-Gen. 11.
 Treffry, Fred. Asst. Paym. Control. Dep. (11.)
 *Trefusis, *Hon.* W. R. Lt.-Col. S.F. Gds. (11.)
 Tremayne, A. Lt.-Col. late 13th Lt. Drs. (11.)
 Trench, C. Major R.A. (11.)
 Trench, *Hon.* C. G. Capt. late 1st. R. Drs. (11.)
 Trench, Frederick C. Capt. 20th Hus. (11.)
 Trench, *Hon.* W. Le Poer Major R.E. (11.)
 *Trevelyan, H. A. Col. late 7th Hussars
 Trevelyan, H. Lieut. 32nd Regt. (11.)
 Trevor, E. A. Capt. R.E. (11.)
 *Trevor, W. C., CB. Col. 54th Regt. (11.)
 Trevor, W. S., *W.C.* Lt.-Col. R.E. (11.)
 Trimen, Richard Capt. late 36th Regt. (11.)
 Trist, Wm. S. G. Lieut. 2nd W. I. Regt. (11.)
 Tritton, F. B. Lt.-Col. (ret.) 18th Regt.
 Tritton, H. F. Capt. 25th Surrey R.V. (11.)
 Trivett, J. F. Lieut. R.N.R. (11.)
 Trollope, Sir C., KCB. Lt.-Gen. Col. 53rd Regt.
 Trotter, H. Lt.-Col. Gr. Gds. (11.)
 Trotter, Henry Capt. R.E. (11.)
 Trousdell, W. G., MD. D. I. G. of Hosps. (11.)
 Trousdell, W. B. P. Lt. late 7th Hus. (11.)
 Troyte, Chas. A. W. Maj. 1st Devon R.V. (11.)
 Tryon, George, CB. Capt. R.N. (11.)
 Tubby, J. H. Assiat. Com.-Gen. (11.)
 Tuite, Hugh Manley Maj.-Gen.
 *Tulloch, Alex. B. Capt. 69th Regt. (11.)
 Tulloh, Alex., CB. Gen. (11.)
 Tully, Thos. Capt. 28th Middx. R. V. (11.)
 Tupper, *Æ.* de Vic Major R.A. (11.)
 Tupper, C. W. Capt. late K.O.L.I. Mil.
 Tupper, De Vic Lt.-Col. late 8th or King's (11.)
 Tupper, G. Le M. Col. R.H.A. (11.)
 Turberville, T. P. Lieut.-Col. R.A. (11.)
 Turnbull, C. F. A. Lieut. 32nd Regt. (11.)
 Turnbull, H. J. L. Lieut. R.A.
 Turnbull, J. F. Col. Car
 Turnbull, J. R. Lt.-Col. 1st
 Turner, A. E. Ca

- Turner, Geo. H. Capt. 17th Regt.
 Turner, T. Capt. 26th Regt. (11.)
 Turner, W. Webb Capt. 3rd Sussex Art. V. (11.)
 Turquand, W. M. G. Capt. late Cold Gds. (11.)
 Tweeddale, MARQUIS of Lieut.-Col. late Gren. Guards.
 Twemlow, Edw. D'O. Capt. R.E. (11.)
 Twemlow, F. R. Lieut. 3rd Staf. Mil. (11.)
 Twemlow, Geo. Lt.-Gen. Col. Comm. R.A. (11.)
 Twentyman, A. C. Capt. 4th King's Own (11.)
 *Twyford, H. R. Lt.-Col. Hants R. Vols. Capt. late 36th Regt. (11.)
 Tylee, Alfred Col. (ret.) R.A. (11.)
 Tynte, Mervyn C. S. Capt. 4th Dr. Gds. (11.)
- UPTON, Hon. Arthur General (11.)
 Underwood, A. G. Capt. 36th Middlesex R.V. (11.)
 Underwood, P. C. Lieut. R.N. (11.)
 Uttersson, A. H. Major 17th Regt. (11.)
- VACHER, F. S. Lt.-Col. (11.)
 Vandeleur, C. T. B. Capt. late 12th Lancers (11.)
 Vandeleur, T. B. Capt. 7th R. Fus. (11.)
 Vander-Meulen, J. H. Capt. 35th Regt. (11.)
 Van-Heythuysen, G. Capt. 14th Regt. (11.)
 Van-Straubenzee, T. Lt.-Col. R.A. (11.)
 Varlo, Henry Capt. (h.p.) R.M. L.I.
 Vassall, Rawdon J. P. Lieut.-Gen. (11.)
 Vaughan, H. B. Maj. (11.)
 Vaughan, J. F. Lt.-Col. R. Mon. L. I. M.
 Vaughan, J. L., CB. Maj.-Gen. (11.)
 Venner, L. S. Lt.-Col. (11.)
 Vereker, T. G. Major
 Verity, C. F. Capt. 2nd Middx. R.V. (11.)
 Verney, Sir Harry, Bart. Major late Gr. Gds. MP. (11.)
 Vernon, G. A. Lieut.-Col. late Cold. Gds.
 Vernon, Hon. Geo. W. H. Lieut. Scots Fus. Gds. (11.)
 *Vesey, G. H. Maj.-Gen. late R.A. (11.)
 Vickerman, W. J. Capt. 36th Middx. R.V. (11.)
 *Vickers, C. B. Lt.-Col. 2nd Middx. R.V. (11.)
 Vidal, Chas. J. Capt. R.N. (11.)
 Villiers, Hon. G. P. H. Capt. Gr. Gds. (11.)
 *Vincent, C. E. H. Lt.-Col. 40th Middlesex R.V., late 23rd R.W. Fus. Capt. late Rl. Berks Mil. (11.)
 Voules, W. J. Capt. late 7th Fus. (11.)
 Voyle, G. E. Major-Gen. R.A. (11.)
 Voyle, F. R. C. Capt. Beng. S.C. (11.)
 Vyner, R. C. de Grey Capt. (ret.) Gr. Gds. (11.)
 Vyse, G. Howard Col. (ret.) 2nd L. Gds.
- WACE, R. Capt. R.A. (11.)
 *Wade, Hamlet Coote, CB. Col. (11.)
 Wabab, G. D. Capt. 20th Regt.
 Wabab, H. J. Maj. Paym. 48th Regt. (11.)
 *Wake, A. J. Major R.A. (11.)
 Wake, R. W. Lt.-Col. (h.p.) R. Afr. Corps
 Wale, Rev. Henry J. late Lt. 2nd Drs.
 Walhouse, Edward Capt. (ret.) 12th Regt.
 Walker, A. G. Lieut. R.A. (11.)
- Walker, C. P. Beauchamp, CB. Maj.-Gen. (11.)
 Walker, D. Corrie Major R.E. (11.)
 Walker, F. W. E. F. Lt.-Col. S. F. Gds. (11.)
 Walker, G. F. Lieut.-Col. 12th Regt. (11.)
 *Walker, G. G. Lt.-Col. Scottish Borderers Mil. (11.)
 Walker, Sir Geo. R., Bart. Capt.
 Walker, Henry C. Lieut. R.N. (11.)
 Walker-Myln, Hercules Lieut.-Col.
 Walker, John Capt. late 66th Regt. (11.)
 Walker, John B. Capt. R.A. (11.)
 Walker, Robt. Capt. Lon. Rifle Brig. (11.)
 Walker, S. Lt.-Col. late Q. O. L. Inf. Mil.
 Walker, W. Capt. late 69th Regt. (11.)
 Walker, W. L. Lt.-Col. (ret.) Indian Army (11.)
 *Walkey, R. Capt. R.A. (11.)
 Wallace, Chas. J. S. Maj.-Gen.
 Wallace, James Lt. 72nd Highl. (11.)
 Wallace, N. W. Capt. 60th Rifles (11.)
 Wallace, W. A. J. Capt. R.E. (11.)
 *Waller, Geo. H. Col. 7th R. Fus. (11.)
 Waller, S. Lieut. R.E. (11.)
 Walpole, Horatio J. T. Capt. Rifle Brig. (11.)
 Walsh, Hon. A., MP. Capt. late 1st L. Gds.
 *Walton, C. E. Dep. Com. (11.)
 Walwyn, Jas. H. Capt. 23rd R. W. Fus.
 Waundesford, C. H. B. C. Lt. late Gr. Gds. (11.)
 Ward, Edw. Wolstenholme, CMG. Col. R.E. (11.)
 Ward, John Lt.-Col. late 91st Highlrs.
 Ward, John Ross Rear-Adm. (11.)
 Ward, J. W. Lt. 8th or King's (11.)
 *Ward, Thos. Le H. Capt. R.N. (11.)
 Ward, Hon. W. J. Capt. R.N. (11.)
 Warde, C. A. M. Lieut.-Col. late R.A. (11.)
 Warde, Sir E. C., KCB. Lieut.-Gen. (11.)
 Warde, Sir Francis, KCB. Lieut.-Gen. Col. Comm. R.A. (11.)
 Warden, Robert, CB. Maj.-Gen. (11.)
 Wardlaw, Robt., CB. Maj.-Gen. (11.)
 Waring, Walter T. Capt. Kent Art. (11.)
 Warner, Wynyard H. Capt. late 101st Regt. (11.)
 Warre, F. Lieut. late E. Kent Militia
 Warre, Hy. J., CB. Maj.-Gen. (11.)
 Warren, Charles Capt. R.E. (11.)
 Warren, William Capt. R.A. (11.)
 Warton, R. G. Lieut. 10th Regt. (11.)
 Watson, A. J. Lieut. 12th Regt. (11.)
 Watson, O. E. Lt.-Col. (ret.) 18th R.I. (11.)
 Watson, C. M. Lieut. R.E. (11.)
 Watson, D. Maj.-Gen. (11.)
 Watson, F. G. D. Capt. I. of W. Art. Mil. (11.)
 Watson, G. L. Lt. (ret.) 1st L. Gds. (11.)
 Watson, Henry W. Lieut. late R.E. (11.)
 Watson, H. J. Capt. 1st King's Dragoon Guards (11.)
 Watson, T. C. Lt. late 75th Regt. (11.)
 *Watts, J. G. Major Bom. S. C. (11.)
 Waugh, Sir A. Scott, Kt., FRS. Major-Gen. R.E. (11.)
 Wavell, A. G. Lieut. 9th Regt. (11.)
 Wavell, A. H. Maj. 41st Regt. (11.)
 *Waveney, LORD Col. Suffolk Mil. Art. ADC. to the Queen (11.)
 Weatherley, F. A. Capt. (ret.) 6th Drs.
 Webb, Francis E. Capt. 28th Regt.

Webb, Theodosius	Capt. late R.E.	Wildman, C. W.	Capt. 87th Regt. (11.)
Webb, W. F.	Lt. late 17th Lancers (11.)	Wildman, John	Col. (11.)
Webber, O. E.	Major R.E. (11.)	Wilkins, Joseph W.	Lieut. R.N. (11.)
Webster, G. M., MD.	Staff Surg.	Wilkinson, E. H.	Commr. R.N. (11.)
Webster, Robt. G.	Capt. 4th Royal Lanc. Mil. (11.)	Wilkinson, F. G.	Maj.-Gen. (11.)
Wegg-Prosser, F. R.	Maj. 1st Mid. Art. V. (11.)	Wilkinson, G. A.	Col. R.A. (11.)
Wegg-Prosser, J. F.	Lieut. Rifle Brig. (11.)	Wilkinson, H. C.	Lt.-Col. 16th Lanc. (11.)
Welby, A. O. E.	Capt. 2nd R. N. B. Drgs. (11.)	Wilkinson, H. G.	Lt.-Col. late S. F. Gds.
Weldon, F.	Major Madras Staff Corps (11.)	Wilkinson, Josiah	Major 105th Regt. (11.)
Welleley, Arthur C.	Capt. Gr. Gds. (11.)	Willan, L. P.	Commr. R.N. (11.)
Welleley, Hon. F. A.	Lt.-Col. Cold. Gds. (11.)	Willes, Aug.	Capt. late 104th Fus.
Welleley, G. G., CB.	Adm. (11.)	Willes, Geo. O., CB.	Rear-Adm. (11.)
Welleley, W. H. C.	Col.	Williams, D. W.	Lt.-Col. Madras Army (11.)
Wells, Richard	Capt. R.N. (11.)	Williams, E. A., CB.	Col. R.A.
Welsh, D. I.	Major R.A. (11.)	Williams, J. Aubrey	late Lt. 60th Rifles (11.)
West, James B.	Capt. R.N.	Williams, J. W. C.	Col. R.M.A. (11.)
West, Hon. M. S.	Capt. late Gren. Gds.	Williams, L.	Major 5th W. York Mil. (11.)
Westbury, R. L. P. Lord	Lieut. Scots Fus. Gds. (11.)	*Williams, O. L. C.	Col. R. H. Gds.
Westby, A. G.	Capt. (ret.) 8th or King's	Williams, Sir Wm. Fenwick, Bart., of Kars, GCB. Gen. Col. Commr. R.A. (11.)	
Westby, B. C.	Capt. 16th Regt. (11.)	Williams, W.	Major late 103rd Fus. (11.)
Westby, B. H.	Capt. (h.p.) 16th Regt. (11.)	Willock, G. W.	Capt. 3rd Beng. Cav. (11.)
Westloe, F. H.	Lt. 106th Regt. (11.)	Willock, John H.	Capt. R. Lon. Mil. (11.)
Westmacott, Spencer	Col. R.E.	Wilmot, Francis	Capt. 16th Regt. (11.)
Wethered, E. R.	Major Paym. R.A. (11.)	Wilmot, F. M. Eardley, FRs.	Major-Gen. R.A. (11.)
Wetherall, W. A.	Lieut. Bo. S. Corps (11.)	Wilmot, Sir Hen., Bart., W.C.	Lieut.-Col. Derby R.V. MP. (11.)
Whaley, Hen.	Lieut. North York Rifles (11.)	Witmot, Sydney, M. E.	Lieut., R.N. (11.)
Whalley, J. L.	Capt. 1st R. Lanc. Mil., Maj. 4th Ad. Brigade Lanc. Artillery Vols. (11.)	Wilmot, W. A. Eardley	Capt. 5th Fus. (11.)
Wharnccliffe, E. M. G. Lord	Lt.-Col. late 1st W. York Yeo. late Lt. Gr. Gds.	*Wilson, Charles T.	Capt. late 4th King's Own, Capt. 7th Lanc. Mil. (11.)
Wheatley, Wm.	Lt.-Col. (ret.) S. F. Gds.	Wilson, C. W.	Major R.E. FRs. (11.)
Wheeler, J. Ross	Lt.-Col. (ret.) 29th Regt.	Wilson, C. W. H.	Capt. 6th B. Regt.
Wheeler, J. S.	Capt. 8th or King's (11.)	Wilson, Fitz-Roy	Capt. Rifle Brigade (11.)
Whiffen, H. W. S.	late War Office (11.)	Wilson, Fred. W.	Capt. R.N. (11.)
Whimper, F. A., CB.	Maj.-Gen.	Wilson, Geo. H.	Lieut. 26th Regt. (11.)
Whinfield, C. W.	Capt. R.E. (11.)	Wilson, H. B.	Capt. 71st L.I. (11.)
Whish, C. F. D.	late Lt. 85th Regt. (11.)	Wilson, J. C.	Capt. R.N. (11.)
Whitaker, G. T.	Capt. 60th Rifles (11.)	Wilson, J. J.	Lieut.-Col. R.E. (11.)
Whitbread, J. W.	Capt. late Suffolk Art. Vols. (11.)	*Wilson, John	Major late 42nd High. (11.)
White, A. Lt.	late Queen's West. R.V. (11.)	*Wilson, S. W. F. M.	Col. late 18th R.I. (11.)
*White, C. H.	Capt. and Adj. Cheshire Mil. (11.)	Wilson, T. M.	Lt.-Gen. (11.)
White, Chas. W.	Lt. West Kent Mil. (11.)	*Wilson, W. H.	Capt. 43rd Regt. (11.)
*White, David	Lieut. R.N.R. late Indian Navy (11.)	Windsor-Olive, Hon. G. H. W.	Lt.-Col. (ret.) Cold. Gds. MP. (11.)
White, F. B. P.	Capt. 1st W.I. Regt. (11.)	Wingfield, Digby H. R.	Capt. late R. H. Gds.
White, H. D., CB.	Major-Gen. (11.)	Wingfield, F.	Dep. Asst. Com.-Gen. (11.)
White, R. H.	Col. S. F. Gds. (11.)	Winmarleigh, Right Hon. Lord	Col. 3rd Lanc. Mil., ADC. to the Queen
White, W. Lambert	Capt. 4th E. Y. Art. Vols. (11.)	Wirman, Theodore	Col. late 6th Dras. (11.)
Whitehead, F. G. Col. Com.	Essex Rifles (11.)	Wise, Aug.	Capt. 2nd Warwick Mil. (11.)
Whiteborne, A. H.	Lieut. R.A. (11.)	Wombwell, A.	Lt.-Col.
Whitehouse, Alfred	Paymtr. R.N. (11.)	Wood, Elliott	Lt. R.E. (11.)
Whitelocks, G. F.	Lt.-Col. late Ben. Army (11.)	*Wood, Henry	Major Rifle Brig.
Whitla, W.	Major 10th Regt. (11.)	Wood, H. G.	Col. 8th or King's
Whitmore, E. A., CB.	Col. (11.)	Wood, H. W.	Major R.E. (11.)
Whitwell, John	Lt.-Col. 1st Westm. R.V. MP. (11.)	Wood, J. Andover	Major (h.p.) Madras Army (11.)
Whyte, W. H.	Capt. R.N. (11.)	Wood, Patrick	Major 9th Essex R.V. (11.)
*Wickham, E. H.	Capt. R.A. (11.)	Wood, Wm. Mark	Lt.-Gen.
Wigram, J. R.	Capt. late Cold. Gds. (11.)	Woodall, J. W.	Major late E. and N. York. Art. Mil. (11.)
Wilbraham, Sir Rich., KCB.	Lt.-Gen. (11.)	Woodford, Sir J. G., KCB. KCH.	Gen. (New A.)
Widdow, Fred.	Asst.-Surg. late Cold. Gds.	Woodhead, H.	
		Woodhouse, A. P.	Capt. 6 th
		Woodrow, Alex. K.	I

Woods, Wm. Fell	Capt. late 40th Mid. R.V.	XIMENES, W. R.	Capt. (ret.) 8th or King's (11.)
(11.)			
Woodward, John	Capt.		
Woodward, W. W.	Maj. R.H.A. (11.)	YARBOROUGH, EARL of	late Captain
Woolsey, O'B. B.	Col. R.A. (11.)	R. N. Lincoln Mil. (11.)	
Worcester, H. A. W. F., MARQUESS of	Capt.	Yarmouth, EARL of	Capt. late Gr. Gds.
R. H. Gds. (11.)		(11.)	
Worsley, Francis	Capt. late I. of W. Mil. (11.)	Yates, H. Peel	Col. R.A. (11.)
Worsley, G. F.	Major R.A. (11.)	Yolland, W.	Col. late R.E. (11.)
Wray, Henry	Col. R.E. (11.)	*Yonge, G. N. K. A.	Col. (11.)
*Wright, A. F. B.	Capt. 101st Regt. (11.)	Yonge, W. L.	Lieut.-Col. R.A. (11.)
Wright, C. J.	Lt.-Col. 1st Notts. R.V. MP. (11.)	Yorke, Sir Charles, GCB.	Gen. Col.
		Rifle Brigade (11. 10s.)	
*Wright, D.	Surg. Ben. S.C. (11.)	Yorke, J., CB.	Lieut.-Gen. (11.)
Wright, H. O. P.	Lieut. R.M.L.I. (11.)	*Yorke, P. C.	Capt. 4th King's Own Regt. (11.)
Wright, William H.	Lt. R.A. (11.)	Yorke, Philip S.	Capt.-Col. 12th Ben. Cav. (11.)
Wrottesley, Hon. Geo.	Col. R.E. (11.)	Young, Chas. Allen	Major
Wyatt, H. F. J.	Lieut. R.N. (11.)	Young, J. S.	Dep.-Commissary (11.)
Wyatt, Sir Matthew	late Lt. Hon.	Young Richard R.	Lt. 73rd Regt. (11.)
Corps of Gentlemen-at-Arms (11.)		Young, S. S.	Maj. 89th Middx. R.V. (11.)
Wygram, Godfrey J.	Lt.-Col. Cold. Gds.	Young, Thos.	Maj. (ret.) 37th Regt. (11.)
Wyndham, W. G. C.	Lieut. 21st Hus. (11.)	Younghusband, C. W.	Col. R.A.
Wynne-Finch, C.A.	Lt.-Col. S.F. Gds. (11.)		
Wynne, E. W. L.	Col. Gr. Gds.		
Wynne, G.	Lt.-Gen. R.E. (11.)		
Wynyard, E. G.	Major-Gen. (11.)		

LIST OF LIFE MEMBERS.

- ACHESON, *Hon.* E. A. Brabazon Lt.-Col.
Cold. Gds. (91.)
- Acland-Troyte J. E. Lieut. 4th King's
Own Regt. (91.)
- Acland, W. A. D. Lt. R.N. (91.)
- Adair, H. A. Capt. (ret.) 52nd L.I. (91.)
- Adams, E. S. Capt. R.N. (91.)
- Airey, J. M. C. Comr. R.N.
- Airey, J. T., CB. Major-Gen.
- Aitchison, H. C. Comr. R.N. (91.)
- Alcock, T. St. L. Hon. Col. R. E. Mid. Mil. (91.)
- Aldham, W. C., CB. Vice-Adm. (91.)
- Alexander, R. Lt.-Gen. Col. 24th Mad. N.I.
(91.)
- Alexander W. Gordon Major 93rd Highlrs.
(91.)
- Allen, J. L. Dep.-Lt. Perthshire
- Alleyne, Douglas Maj. 37th Regt. (91.)
- Alt, W. J. Capt. 15th Surrey R.V. (91.)
- Alves, W. L. Lieut. R.A. (91.)
- Anderson, A. Dunlop Capt. Beng. S. C. (91.)
- Andoe, Hilary G. Comr. R.N. (91.)
- Arbuthnot, C. R. Lieut. R.N. (91.)
- Archer, Clement R. Capt. late 4th Dr. Gds.
- Archer, G. W. Capt. R.E. (91.)
- Armstrong, Sir Alexander, KCB. LL.D.
FRS., *Director-General Medical Department of the Navy* (91.)
- Armstrong, T. Maj. late 2nd W. I. Regt.
- Arnold, Stanley Capt. Royal Lanc. Art.
Mil. (91.)
- Arthur, Albert F. Lieut. R.N. (91.)
- Ashmore, Chas. Gen. Col. 30th Regt.
- Astley, F. D. Lieut. Scots Fus. Gds. (91.)
- Atkinson, T. Capt. (ret.) 1st Royals (10s.)
- Austin, Thomas Colonel late 69th Regt.
- Aylmer, F. C. Col. (91.)
- Aylmer, H. Major-Gen. R.A. (91.)
- BABBAGE, Henry P. M.-Gen. Unatt. (91.)
- Bacon, Sir H. B., *Bart.* Lt. G. Gds. (91.)
- Baddeley, F. H. Maj.-Gen. R.E.
- Badgley, W. F. Capt. Ben. S. C. (91.)
- Bagot, C. Col. 3rd K.O. Staff. Mil., late Gr.
Gds.
- *Bagot, George Col. late 69th Regt. (91.)
- Baillie, Hugh S. Lieut. R.N. (91.)
- Baldock, W. Lt. late Rifle Brigade
- *Balfour, C. James Capt. R.N.
- Balfour, F. W. Major late Rifle Brig. (91.)
- Balfour, Sir Geo., KCB. Lt.-Gen. R.A. MP. (91.)
- Balfour, R. F. Lt.-Col. Gren. Guards. (91.)
- Barclay, A. K. Capt. late Sur. Yeo.
- Barclay, D. W. Capt. late 90th L.I.
- Barlow, G. Maj. late 4th Royal Lanc. Mil.
- Barnston, R. H. Dep.-Lt. Cheshire
- Barreto, *The Baron*, FRSL. Capt. late 4th
R. S. Middx. Mil. (91.)
- Barstow, John A. Maj. late 89th Regt. (91.)
- Bartley, J. Cowell Maj.-Gen.
- *Barton, Edward Capt. 27th Regt.
- Barton, R. J. Capt. Cold. Gds. (91.)
- *Bateman, H. W. Capt. 31st Regt. (91.)
- Bates, C. Ellison Capt. Bengal S. C. (91.)
- Bayfield, H. W. Admiral
- Bayley, J. A. Maj. late 52nd Regt. (91.)
- Baylis, E. W. D. Capt. 36th
Middx. R.V., FRGS. (91.)
- *Baylis, T. Henry Major 36th Middlx.
R.V. Q.C. (91.)
- *Baylis, T. Erskine Capt. R. Elthorne M.
(91.)
- Bayly, Geo. Cecil Capt. R.A. (91.)
- Bayly, John, CB. Col. R.E. (10s.)
- Bayntun, W. H. Capt. late 12th Lancers
- Beadon, George Capt. R.N.
- Beamish, Cauld. F. Capt. late 45th Regt. (91.)
- Beaucherk, *Rt. Hon.* LORD Amelius W.
Capt. R.N.
- Beaumont, Lewis A. Comr. R.N. (91.)
- Beazley, Geo. G. Major 83rd Regt. (91.)
- Bedford, DUKE OF Lieut. late S.F. Gds.
- Bell, Chas. Wm. late Lt. 15th Hus.
- Bell, Mark S., *W.C.* Capt. R.E. (91.)
- Beresford, C. E. de la P. Lt. 46th Regt. (91.)
- Beresford, W. H. Capt. late Rifle Brig.
- Best, *Hon.* Henry late Mid. R.N. (91.)
- Best, T. C. H. Major (ret.) 72nd Highls.
(91.)
- Betty, J. F. Major R.A. (91.)
- Bewicke, Calverley T. Lieut. R.N. (91.)
- Biddulph, M. W. Lieut. 5th Fus. (91.)
- Bidwell, J., FSA. late Lt. Queen's R.V.
- Bingham, G. W. P., CB. Major-Gen.
- Birch, George F. Major Hants Mil. (91.)
- Birch, Lightwood T. Lieut. the King's Own
1st Stafford Mil. (91.)
- Black, B. West Major-Gen. R.A. (91.)
- Black, James Scott Capt. late 11th Hus. (91.)
- Black, William late Mid. R.N.
- Black, W. T. Surg.-Major (91.)
- Blackwood, Sir Francis, Bt. Comr. R.N.
(91.)
- Blair, W. Fordyce Capt. R.N.
- Blake, Wm. G. Capt. 3rd W. York Mil. (91.)
- Bland, F. Maltby late Mid. R.N. (91.)
- Blanshard, Rich. late Lieut.-Gcv.
of Vancouver's Island
- Blundell, H. B. H. Lt.-Col. Gr. Gds. (91.)
- Boileau, C. L. Major late Rifle Brigade (11s.)
- Bonamy, John Lt.-Col. (ret.) 6th Regt.
- Bonhote, John Lieut. late 84th Regt. (91.)

- Borland, Oswald Capt. R.N.
 Borton, Arthur, CB. Lieut.-Gen.
 Boulderson, Samuel Major 17th Lanc. (91.)
 Bourbel, Le Marquis de Lt.-Col. R. E. (91.)
 Bourchier, Jas. J. Maj. (ret.) 52nd L.I. (91.)
 Bourke, Paget J. Capt. R. Body Guard (91.)
 Bourne, Jas. Col. Commt. R. Lanc. Art. Mil. MP. (91.)
 Bousfield, N. Major 1st Lanc. R.V. MP. (91.)
 Boustead, John Army Agent (91.)
 *Bowden-Smith, Nath. Capt. R.N. (91.)
 Bowker, J. H. Comdt. Cape Mounted Police (91.)
 Boyd, Arch. D. Capt. 1st R.E. Mid. Mil. (91.)
 Braudreth, Thomas Capt. R.N. (91.)
 Bransfill, B. A. Major late 86th Regt. (91.)
 Branson, C. E. D. Capt. H.M.I.M.F. (91.)
 Brassey, T., Capt. Cinque Ports Art. Mil. MP. (91.)
 Bray, G. F. C. Lt.-Col. 96th Regt. (91.)
 Breton, H. W. Gen. Col. 56th Regt. (91.)
 Breton, Peter Wright Capt. Hants Mil. (91.)
 Breton, W. H. Comr. R.N. (91.)
 Bright, R. O. B., CB. Maj.-Gen.
 Brigstocke, G.C.H.P. Capt. late 4th Dr. Gds.
 Brocas, Bernard Lt. late 6th Dr. Gds.
 *Brodigan, F. Major 28th Regt. (91.)
 Brook, G. S. Ordn. Storekeeper
 Brooke, Charles K. Capt. 15th Regt. (91.)
 Brooshooff, E. A. D. Lt.-Col. 4th E. York. Art. V. (91.)
 Brown, James Comr. R.N. (91.)
 Brown, J. C. Capt. R. Lanc. Art. Mil. (91.)
 Brown, R., FR.S. FLS. late Surgeon Scotch Fencible Regt.
 Brown, Sir W. R., Bart. Col. 1st Lanc. Art. V. (91.)
 Brown, W. E. Lieut. 15th Regt. (91.)
 Browne, Augustus Lt. R.A. (91.)
 *Browne, H. R. Col. 63rd Regt. (91.)
 Browne, Ven. Archde. R. W., M.A. late Chaplain to the Forces
 Browne, W. B. Ensign late 68th L.I.
 Bryce, J. Capt. late 5th Dr. Gds. (91.)
 Buccleuch, Walter F.M. DUKE of, KG. KT. FR.S., Lord-Lieut. Co. Mid-Lothian
 Buckle, Claude E. Capt. R.N. (91.)
 Ruckle, W. Hill late Lieut. 14th Regt.
 Bucknill, J. T. Lieut. R.E. (91.)
 Bulger, G. E. Lt.-Col. late 10th Regt. (91.)
 Buller, Alexander, CB. Capt. R.N. (91.)
 Buller, E.M. M. Col. (h.p.) Rifle Brigade (91.)
 Burdett, Francis Lt.-Col. late 17th Lancers
 Burdett, Sir Robert, Bt. Col. late 68th L.I.
 Burghley, B.H.G.C. LORD Capt. Gr. Gds. (91.)
 Burke, W. St. Geo. Capt. R.E. (91.)
 Burrard, Sidney Lt.-Col. (ret.) Gr. Gds.
 Burris, E. N. Lieut. late Ceylon Rifles
 Burroughs, F. W., CB. Col. late 93rd Highlrs. (91.)
 Burrows, R. E., KH. Col. late 66th Regt.
 Burslem, G. J. Capt. late 94th Regt.
 Butler, H. T. (91.)
 Buxton, J. W. F. I (91.)
- *Bythell, R. Major. Bo. S. C. (91.)
 *Bythesse, J., B.C. Capt. R.N. (91.)
 CAMBRIDGE, H.R.H. GEORGE W.F.C. DUKE OF, KG. GCB. GCMG. Field-Marshal Commanding-in-Chief, PRESIDENT OF THE INSTITUTION (91.)
 *Cadman, W. E. Major 5th W. York Mil. (91.)
 Caldwell, Charles B. Capt. late 66th Regt.
 Caldwell, W. C. Capt. late 47th Regt. (91.)
 Calvert, A. M. Lieut.-Col. R. A. (91.)
 Call, C. F. Lieut. R.E. (91.)
 Campbell, A. J. Lt.-Col. late 16th Regt.
 Campbell, Archibald Col. late 46th Regt.
 Campbell, D. L. Lieut. late 9th Lancera
 Campbell, H. J. F. Comr. R.N. (91.)
 Campbell, Robert Comr. R.N. (91.)
 Cannon, Edward St. Lager Vice-Adm.
 Cannon, Frederick Capt. R.N.
 Carey, Le Marchant Capt. late 66th Regt.
 Carey, W. Major R.A. (91.)
 Cargill, John Lt.-Col. Otago V. (91.)
 Carington, C. R., LORD Capt. R. H. Gds. (91.)
 Carlyon, T. F. Capt. 76th Regt. (91.)
 Carmichael, G. Lynedoch Lt.-Col. late 95th Regt.
 Carpenter, C. Comr. R.N. (91.)
 Carr, Henry J. Comr. R.N. (91.)
 Carr, R. E. Major 36th Regt. (91.)
 Cavan, P. C. Lt.-Col. late 30th Regt. (91.)
 Cave, Lawrence Trent Capt. late 54th Regt. (91.)
 Chadwick, Osbert Lieut. late R.E. (91.)
 Chalmers, P. Capt. late 3rd Dr. Gds.
 Chaloner, Thomas Vice-Adm. (91.)
 Chamberlain, Henry Lieut. R.N. (91.)
 Chamberlaine, W. C. Rear-Adm. (91.)
 Chambers, Montague late Lieut. 71st High. L.I. Q.C. (91.)
 Champenowne, Henry Capt. R.E. (91.)
 Charlewood, E. P. Rear-Adm. (91.)
 Chichester, Hon. Aug. G. C. Col. (91.)
 Chichester, Sir Alex. P. B., Bart. Lieut. Devon. Yeo. (91.)
 Christie, S. Hunter, M.A. late Prof. R.M. Acad.
 Christie, W. J. Capt. late Gren. Gds.
 Churchill, Lord Alfred late Lt. 83rd Regt.
 Clarke, Geo. Calvert, CB. Major-Gen.
 Clarke, H. W. Capt. R.E. (91.)
 Clarke, M. de S. M'K. G. A. Major 50th Regt. (91.)
 Clayton, Matthew Capt. late Northum. Yeo.
 Clerk, Godfrey Lt.-Col. Rifle Brigade (91.)
 Cleveland, Henry F. Capt. R.N. (91.)
 Clinton, H. Col. (ret.) 11th Huss.
 Clinton, Hen. R. Lt.-Col. (ret.) Gr. Gds. (91.)
 Close, Geo. C. Major late 45th Regt. (91.)
 *Clutterbuck, T. St. Quintin Capt. 29th Punjab Infantry (91.)
 Cochrane, T. B. H. Lieut. R.N. (91.)
 *Cockburn, C. F. Lt.-Col. R.A. (91.)
 Cockburn, J. P. late Lt. 1st Warwick Mil. (91.)
 Cocks, Philip Reginald Col. late R.A. (91.)
 *Codrington, W. Capt. R.N. (91.)

Coffin, J. Townsend	Adm.	Dennis, James B.	Maj.-Gen. B.A.
Cole, Joshua	Comr. B.N. (91.)	Dennis, M. S. T.	Lt.-Col.
Collett, H.	Major Beng. S.C. (91.)	Dennistown, E. J. W.	Capt. 64th Regt. (91.)
Collings, J. E., CB.	Col. (91.)	Derby, The Earl of, CB.	(91.)
Cologan, J. Fitz-G. F.	Capt. 18th Bengal N.I. (91.)	Derriman, S. H., CB.	Rear-Adm. (91.)
Conroy, H. G.	Col. late Gr. Gds.	De Winton, C. L.	Maj (ret.) 76th Regt. (91.)
Conybeare, Fredk.	Major-Gen. R.A. (91.)	Dicken, H. Perry	Comr. R.N.
Cooke, J. G.	Capt. 7th Lanc. Mil.	Dickins, H. F.	Quar.-Mar. Vict. R.V. (91.)
Cooke, William	Lt. Madras S.C. (91.)	Dickinson, Edwd.	Lieut. R.E. (91.)
Cookes, George	Capt. (81.)	Digby, Hon. E. H. T.	Capt. Cold. Gds. (91.)
Cooper, D. S.	Capt. late 1st Royals	Digby, J. A.	Lt.-Col. late Gr. Gds.
Cooper, Henry	Lt.-Gen. Col. 79th Reg.	Dixon, Matthew	Capt. R.N.
Cooper, J. C.	Capt. (ret.) 8th Regt. (91.)	Domville, W. C. H.	Lieut. R.N. (91.)
Cooper, Leon Morse	Col.	Donovan, E. W.	Maj.-Gen. (91.)
Coote, Robert, CB.	Rear-Adm. (81.)	*Doughty, Chester	Capt. and Adj. Hereford Mil. (91.)
Corbett, William	Major late 52nd L.I.	Douglas, Charles	Col. E.A. (91.)
Corry, Alvin C.	Lieut. R.N. (91.)	Drax, J. S. W. E.	Capt. late E. Kent Mil. MP. (91.)
*Cox, J. W., CB.	Col. (91.)	Drummond, Alf. M.	Capt. late Rifle Brig. (91.)
Craig, John	Col. R. N. Down Rifles (91.)	Drummond, C. G. A.	Capt. late Rifle Brig. (91.)
Craigie, R. W.	Comr. B.N. (91.)	Drummond, Hon. Sir James Robert, KOB.	Vice-Admiral
Crawford, Alex. de C.	Lieut. R.N. (91.)	Dugmore, W. F. J.	Lieut.-Col. (ret.) S. F. Gds.
Crawford, C.	Capt. R.E. (91.)	Dunbar, John G. H. W.	Lieut. 1st Life Gds. (91.)
Crawley, H.	Lt.-Col. late 20th Regt. (91.)	Dundas, P.	Col. late 96th Regt.
Creak, Ettrick W.	Staff Comr. R.N. (91.)	Dunn, R. G.	Capt. late 9th Regt. (91.)
Creslock, J. North	Major 95th Regt. (91.)	Dunlop, Hugh, CB.	Vice-Adm. (81.)
*Croft, Richard B.	Lieut. R.N. and Capt. Herts Yeo. FRMS. (91.)	Duntze, J. A.	Adm.
Crofton, John F.	Lt.-Gen. Col. 6th Regt.	*Durrant, Francis	Capt. R.N. (91.)
Crole, G. S.	Major	Dutton, Wm. Holmes	Col.
Crunkbank, J. D.	Capt. R.E. (91.)	Dyer, S. H.	Capt. (ret.) 8th or King's (91.)
Crutchley, Charles	Lieut.-Gen. (81.)	EDINBURGH, H.R.H., A.E.A., DUKE OF, KG., KT., GOSL. GOMG., Capt. R.N. (91.)	
Cunynghame, Sir A. A. T., KCB.	Lieut.-Gen. Col. 96th Regt. (81.)	*Earle, Wm., OSI.	Col. Gr. Gds. (81.)
Cuppsidge, Alex.	Cornet late 4th Dr. Gds.	Ebury, Lord	Capt. late Flint Yeo.
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Currie, Wm., of Lintholl	Lieut. late Edinb. Mil. (91.)	Edgar, the Rev. J. H.	late Lieut. B.A.
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Custance, H. F.	Col. 1st Norfolk Mil. (91.)	Elliot, Robt.	Comr. R.N. (91.)
D'AGUIAR, H.T.	Lt.-Col. late Gr. Gds.	Elliot, Hon. W. Fitz-William	Lieut. 93rd Highrs. (91.)
Daly, R. T. A.	Lt.-Col. Georgetown Mil. (91.)	Ellis, Arthur E. A., OSI.	Lieut.-Col. Gr. Gds. (91.)
Dalrymple, J. H. N. G. H. Viscount	Lt. R. Horse Gds. (91.)	Ellis, Robert	Capt. late H.A.O.
Dando, A. C.	Capt. R. N. E. (91.)	Elwes, R. H. H. E.	Capt. late 12th Regt.
Daniell, E. S.	Lt.-Col. late 102nd Regt. (91.)	England, W. G.	Comr. R.N. (91.)
Daniell, W. H. M.	Lieut. R.N. (91.)	English, Thomas	Capt. R.E. (91.)
Darwin, Leonard	Lt. R.E. (91.)	Erskine, James E.	Capt. R.N. (91.)
Daubeney, Sir H. C. B., KCB.	Maj.-Gen. (81.)	Evans, T. W.	Dep. Lieut. Derby (91.)
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Dave, Charles	Major late 8th or King's Gds. (91.)	Ewart, David	Col. (ret.) Bengal Art.
Davney, Hon. Eustace H.	Lieut. Cold. Gds. (91.)	Ewart, J. H.	Lieut. 78th Highrs. (91.)
Dawson, H. C.	late Mid. R.N. (91.)	FABER, W.	Lt. late 14th Lt. Dns.
Dawson, Hon. R. M. W.	Capt. (ret.) 92d Highrs. (91.)	Fairfax, Henry	Capt. E.N. (91.)
Dawson, W.	Capt. R.N. (91.)		
Dawson, W. H.	Lt. 6th Inniskilling Dns. (91.)		
Dawe, H. O.	Lt. (ret.) 17th Regt. (91.)		

Fane, Charles G.	Capt. R.N. (91.)	Gibbings, Henry Cornwall C.	Lieut. 108th Regt. (91.)
Fanshawe, Edward Gennys, CB.	Adm.	Gibson, R.	Capt. late 28th Regt.
Farmer, W. R. G.	Capt. (ret.) Gr. Gds.	Gibson, J. C. H.	Lt.-Gen. Col. 8th Hus.
Farquhar, Harry R.	Capt. 24th Regt. (91.)	Gifford, G. A.	Lieut. R.N. (91.)
Farquharson, F.	Gen.	Gill, W. John.	Lieut. R.E. (91.)
Farquharson, G. M.B.	Maj.-Gen. Bomb. Staff Corps (91.)	Gillum, W. J.	Lieut.-Col.
Feilden, Henry	Capt. late 21st R.N.B. Fus. (91.)	Gleichen, Victor F. F. E. G. A. C. F. Count	Rear-Adm. (91.)
*Feilden, O. B.	Lt.-Col. 78th High. (91.)	Glen, Archd.	Capt. 10th Regt. (91.)
Feilding, Hon. P. R.B., CB.	Col. Cold. Gds.	Glen, Joseph Phys.-Gen. (ret.)	Bomb. Army
Fergusson, R. C.	Lieut. S. F. Gds. (91.)	Gloag, A. R.	Col. R.A. (91.)
Ferris, John	Lieut. R.N. (91.)	Goddard, A. Lethbridge	Major R. Wilts
Festing, E. R.	Major R.E. (91.)	Yeo. MP.	
*Field, E.	Capt. R.N.	Godfrey, Henry J.	Lieut. R.N. (91.)
Fife, James, G.	Col. R. E. (91.)	Godman, Ch. B.	Lt. R. Sussex L.I. Mil. (91.)
Filliter, Clavell F.	Lt. 2nd W. I. Regt. (91.)	Godman, R. Temple	Col. (h.p.) 5th D.G. (91.)
Fincham, Herbert Geo.	Assist. Comy. (91.)	Godwin, John	Capt. Mil. Kt. of Windsor (91.)
Fishbourne, E. Gardiner, CB.	Vice-Adm. (91.)	Goldie, James	Major 16th Lancers (91.)
Fisher, E. R. Capt. (ret.)	4th R.I. Dr. Gds. (91.)	Goody, E. C.	Capt. 44th W.Y.R. Vols. (91.)
*Fisher, John A.	Capt. R.N. (91.)	Goodenough, F. A.	Capt. late Calcutta Vol. Gds. (91.)
*Fitzclarence, Hon. Geo.	Comr. R.N. (91.)	Gordon, Lord Douglas W. C.	Lieut. Colds. Gds. (91.)
FitzGeorge, A.	Comr. R.N. (91.)	Gordon, G. T.	Vice-Adm.
Fitzgerald, H. C.	Lt.-Col. (91.)	Gordon, S. E., CB.	Col. R.A.
Fitzherbert, W. H. M.	Capt. Rifle Brig. (91.)	Gordon, Wm.	Lt.-Col. late 25th Regt.
Fitzmayer, Sir James W., KCB.	Major-Gen. R.A. (91.)	Gordon, Wm.	Col. Beng. S. C. (91.)
Fitzwygram, F. W. J.	Col. 15th Huss. (91.)	Gordon, W. E. A., CB.	Rear-Adm. (91.)
Fletcher, E. C.	Lieut.-Gen. (91.)	Gore, James A. Major (h.p.)	71st High. L. I.
Fletcher, Henry M.	Capt. R. London Mil. (91.)	Gorman, W. J.	Capt. late Ceylon Rifles (91.)
Flood, Warden	Capt. late 51st Regt.	Gosset, A.	Maj. (ret.) R.A.
Foley, Hen. Fitzalan C. J.	Lt. 2nd Derby Mil. (91.)	Gosset, M. W. E.	Capt. 54th Regt. (91.)
Forbes, J. A.	Lieut.-Col. late 92nd Highs.	Graham, Andrew, MD.	Fleet-Surgeon (91.)
Fordyce, C. F., CB.	Maj.-Gen. (91.)	Graham, C. S.	Capt. R.A.
Fortescue, H. G.	Capt. late Cold. Gds. (91.)	Graham, Cyril	late Governor Red River Settlements (91.)
Fox, W. V.	Capt. 1st Cheshire Mil. (91.)	Graham, Wm.	Capt. R.N. (91.)
*Frampton, Cyril	Lt. R. M. L. I. (91.)	Grant, A.	Capt. late 61st Regt.
Fraser, Hon. A. W. F.	Capt. Gr. Gds. (91.)	Gray, Bertie J.	Lieut. late Roy. Afr. Corps
Fraser, Thomas	Capt. R.E. (91.)	Gray, C. G.	Lieut.-Col.
Fraser, Sir W. Aug., Bart.	Capt. late 1st Life Gds.	*Grenfell, Hubert H.	Comr. R.N. (91.)
Franklin, Rich.	late Lt. 1st L. Gds.	Grey, Sir George, KCB.	late Capt. 53rd Regt. (91.)
Freeland, H. W.	Dep.-Lt. Sussex (91.)	Grey, H. R. E.	Comr. R.N. (91.)
Freeman, T. A.	Lieut. 70th Regt. (91.)	Griffith, Henry Darby, CB.	Lt.-Gen.
Fremantle, Hon. E. R., CB., CMG.	Capt. R.N. (91.)	Griffith, M. R. M.	Comr. R.N. (91.)
Frith, Cockayne	Capt. late 38th Regt.	Grover, G. E.	Capt. R.E. (91.)
*Fullford, John	Vice-Adm.	Grubb, Alexander	Capt. R.A. (91.)
Fuller, T.	Capt. (ret.) 18th Huss. (91.)	Gunnell, E. H.	Capt. R.N. (10s.)
GALBRAITH, W.	Capt. 85th Regt. (91.)	Gunter, Robert	Lt.-Col. 5th West York Militia, late Capt. 4th Dr. Gds.
Gambier, G. C.	Adm.	Gurdon T. E.	Comr. R.N. (91.)
Gardiner, H. L.	Col. R.A.	*HAGGARD, T. T.	Lt.-Col. R.A. (91.)
Gardiner, J.	Capt. late 5th Dr. Gds.	Haig, C. T.	Capt. R.E. (91.)
Garrett, E.	Comr. R.N. (91.)	Hales, Arthur	Capt. 27th Regt. (91.)
Gascoigne, Fred. C. Trench	Hon. Col. 2nd York. Eng. Vols. late Capt. 66th Regt. (91.)	Halifax, Rt. Hon. Cha.	Viscount, GCB. (91.)
*Gassiot, Sebastian	Comr. R.N. (91.)	*Halkett, J. C. Craigie	Lieut.-Colonel
Geddes, A. D.	Major 27th Regt. (91.)	Stirling Mil. (91.)	
Geddes, J. G.	Lieut.-Col.	Hall, G. B.	Lt. late 19th Lt. Drs.
George, F. D., CB.	Major-Gen. (91.)	Hall, Marshall	Capt. late R.E. Middlx. Mil. (91.)
George, T. Barry	late Lt. 13th L.I. (91.)	Hall, J. P.	Maj. Paym. 94th Regt. (91.)
Gerard, F.	Major Lanc. Hus.	Hall, Thos.	Lt.-Col.
Gerard, Sir Robert T., Bart.	Col. Lanc. Huss. ADC to the Queen	Hall, W. H.	Comr. R.N. (91.)

- Hallowell, Edw. Dep.-Lieut. Middlesex
Hallyburton, J. F. G., Lord, GCH. Adm.
Halsey, H. W. R. W. Dy-Lt. Sussex (91.)
Hamilton, A. P. Admiral (31.)
Hamilton, F. Tower Lieut. R.N. (91.)
Hamilton, Sir C. J. J., Bt., CB. Col. late
S. F. Gds. (31.)
Hamilton, Sir Edw. A., Bart. Capt. (ret.)
Cold. Gds. (91.)
Hamilton, H. G. Capt. R.N. (31.)
Hamilton, Sir J. J., Bart. Lt.-Col.
Hamilton, J. Capt. late Beng. Cav. (91.)
Hammill, Tynte F. Lieut. R.N. (91.)
Hand, G. S., CB. Vice-Adm. (31.)
*Hand, G. Weightman Comr. R.N. (31.)
Hankey, H. A. Gen. Col. 1st Dr. Gds. (31.)
Harcourt, E. W. Col. Cinque Ports
Art. (91.)
Hardinge, Edward Capt. R.N. (91.)
Hardinge, Henry Lieut.-Col.
Hare, H. J. Major 4th W. York Mil.
Harris, J. B. Capt. late 24th Regt.
Harrison, Rev. Oct. Swale, M.A. Chaplain
R.N. (31.)
*Harrison, R. Lieut.-Col. R.E. (91.)
Harman, G. B. Col. (unatt.) (91.)
Harmar, C. D'O. Capt. 39th Regt. (91.)
Hartson, C. G. Capt. late R.M.L.I. (91.)
Hart, A. Fitzroy Capt. 31st Regt. (91.)
Hart, Henry G. Maj.-General (91.)
Hart, Horatio H. Lieut. R.E. (91.)
Hart, Reginald C. Lieut. R.E. (91.)
Hart, Wyndham Lieut. Vict. R.V. (91.)
Harvey, Gillmore Capt. R.N.
*Harvey, J. W. F. Comr. R.N. (91.)
Harworth-Booth, B. B. Lieut.-Col.
22nd E. York Art. V. (91.)
Hawell, W. H. Capt. R.N. (91.)
Hawes, A. B. Capt. late Beng. Army
Hawkins, Ethelred Capt. late 22nd Regt.
Hawkins, F. Capt. late 89th Regt.
Hawkins, J. S. Major-Gen. R.E. (31.)
Hay, Edward O. Lieut. R.A. (91.)
Hay, J. Beckford Lewis Adm.
Hay, J. F. Dalrymple Capt. R. Ayr and
Wigtown Mil.
Hay, John Baker Porter Vice-Adm.
Hay, the Right Hon. Sir John C. D. Bart.,
(CB. DCL. FR.S. MP. Vice-Adm. (31.)
Haygarth, F. Lt.-Col. (ret.) S. F. Gds.
Hayne, C. S. Capt. 2nd S. Devon Mil. (91.)
Heathcote, C. Geo. Lieut. 5th Fus. (91.)
Heathcote, F. A. Lt. 81st Regt. (91.)
Heaton, John R. Lieut.-Col. (91.)
Heary, E. Col. (ret.) R.E. (91.)
Henderson, G. W. M. Capt. late S. F. Gds. (91.)
Henderson, W. H. Lieut. R.N. (91.)
Hemming, Shurlock, CB. Col. 88th Regt. (91.)
Herbert, Hon. A. W. E. M. Lieut. (ret.)
7th Huss. (91.)
Herbert, Ivor J. O. Capt. Gren. Gds. (91.)
Hewitt, Allen J. Lieut. Queen's West.
R.V. (91.)
Hibbs, E. D. Lt.-Col. Bucks Yeo.
Hibbs, J. T. Capt. 71st Highlds. (91.)
Hobart, Hon. H. M. Major late 103rd Regt.
(91.)
Hodge, Sir E. C., KCB. Lieut.-Gen. Col.
18th Huss. (31.)
Holbrook, E. N. W. Lieut. R.M.L.I. (91.)
Holdich, Sir E. A., KCB. Lieut.-Gen. (91.)
Holdsworth, Walter J. Lieut. Lanark Yeo.
Cavalry (91.)
Holford, R. S. Dep.-Lt. Gloucester (31.)
Holland, J. Y. Col. late R.M.L.I. (91.)
Hollist, E. O. Capt. R.A. (91.)
Hooper, R. Wheeler Maj.
Hope, H. W. Capt. (ret.) Gr. Gds. (91.)
Hope, J. E. Col. R.A. (91.)
Hope, Sir Jas., GOB. Adm.
Hope, W., CB. Major-Gen. (91.)
Hoskins, A. H. Capt. R.N. (91.)
Houstoun, Geo. L. Lt. Royal Renfrew
Mil. (91.)
Houstoun, Wallace Vice-Adm.
Howes, H. Capt. late King's O.L.I. Mil.
(91.)
Hubbard, Cecil J. Lt.-Col. Gren. Gds. (91.)
Hulse, Sir Edwd., Bart. Lt.-Col. late S.
Hants Mil.
Humbley, W. Wellington Waterloo Lt.-Col.
late 9th Royal Lancers
Hume, J. R. Lt.-Col. 55th Regt. (91.)
Hume, R., CB. Col. 55th Regt. (91.)
Hussey, W. Hayter Capt. late 26th Regt.
*Hutchinson, A. H. Major R.A. (91.)
Hutchinson, W. B. Paymaster R.N.
Hutton, Edwd. T. H. Lt. 60th Rifles (91.)
*IMLACH, R. W. Lt.-Col. Georgetown Mil.
(91.)
Ingilby, Sir W. Bates, KCB. Lt.-Gen.
Col. Comdt. R.A.
*Inverurie, Lord Captain R. Aberdeen-
shire Highland Mil. (91.)
Irving, Alex., CB. Maj.-Gen. R.A. (31.)
Irving, J. C. S. Capt. 39th Regt. (91.)
Irving, Geo. Clerk Staff Asst. Surg. (91.)
Irving, Lewis Allen Staff Asst. Surg. (91.)
JACOB, S. S. Capt. Bombay Staff Corps (91.)
Jago, John Lt.-Col. 74th Highrs. (91.)
James, Chas. D. Capt. 36th Regt. (91.)
James, W. Major late 26th Regt.
Janvrin, F. late Ens. 20th Regt.
Jekyll, Herbert Lieut. R.E. (91.)
Jervoise, F. J. E. Dep.-Lt. Hants (31.)
Jocelyn, W. H. Lt. R.N. (91.)
Johnson, Allen B. Col. Ben. S.C. (91.)
Johnson, G. V. Col. R. H. A. (91.)
Johnson, Sir H. F. F., Bart. Col.
Johnson, W. S. Lieut. late 83rd Regt.
Johnston, Currell H. Lieut. R.E. (91.)
Johnstone, J. Julius Lieut.-Col. Gr. Gds.
Jones, Douglas F. Lieut. R.A. (91.)
Jones, H. Helsham Major R.E. (91.)
Jones, Loftus F. Capt. R.N. (91.)
*Jones, Oliver J. Rear-Adm. (91.)
Jones, R. Owen Major R.
Josselyn, Fred. J. Capt. 96th
Justice, Philip Capt. 108th

- KELL, W. G.** Capt. late K.O.L.I. Mil.
Kelso, E. B. P. Comr. R.N. (91.)
Kennedy, A. W. M. Clark, FRGS. FLS. Capt. late Cold. Gds. (91.)
Kennedy, J. Douglass Capt. 6th R. Lanc. Mil. (91.)
Kenyon-Slaney, W. R. Lt. Rifle Brig. (91.)
Keppel, Edw. Geo. Capt. 74th High. (91.)
Keppel, W. H. A. Lt. Norfolk Mil. Art.
Kerr, Lord F.H. Vice-Adm.
Kerr, Lord Walter Talbot Capt. R.N. (91.)
Key, Sir Astley C., KCB. FR.S. Vice-Adm. (91.)
Kinahan, Richard G. Comr. R.N. (91.)
King, Henry Capt. R.N.
King, H. B. Comr. R.N. (91.)
King, T. H. late H.E.I.C. Serv.
Knowles, W. Major (ret.) 50th Regt.
- LAMB, Henry** late Lieut. I.N. (91.)
Lambert, Thomas Capt. R.A. (10s.)
Lansdowne, MARQUIS of (91.)
Laroom, the Rt. Hon. Sir T. Aiskew, Bart., KCB. Maj.-Gen. R.E.
Lardner, Wm. Lt. late 2nd W. I. Regt.
Lardy, Christian F. Lt.-Col. late 53rd Regt.
Lauderdale, EARL of, GCB. Adm. (91.)
Law, E. D. Comr. R.N. (91.)
Lawrence, J. E. Capt. late I.N.
Lawrence, Sir A. Johnstone, KCB. Lt.-Gen. Col. 58th Regt. (91.)
Lawrence, Lord, GCB. GCSI. (91.)
Lawson, Robert Insp.-Gen. Hospitals (91.)
***Layard, C. E.** Capt. 15th Regt. (91.)
Leah, Henry Lt. R.N. (91.)
Leask, William Major 2nd Hertfordshire R.V. (91.)
Lecky, J. G. Lt.-Col.
Lee, J. H. late Lieut. S. Hants Mil.
Leeds, The Duke of, Major late North York Mil. (91.)
Lees, E. B. Major 31st Lanc. R.V. (91.)
***Le Mesurier, F. A.** Capt. R.E. (91.)
Lendy, A. F. Capt. R. S. Middx. Mil. (91.)
Lennox, Lord J. G. Lieut.-Col. late 6th Drags.
Lennox, W. O., B.E. CB. Col. R.E. (91.)
Lewis, Henry Comr. R.N. (91.)
Ley, J. M. Col.
Liddell, Hon. Geo. A. F. Col. (91.)
***Liddell, W. H.** Capt. R.N. (91.)
Lindsay, W. J. Lt. Rifle Brigade (91.)
Lindsell, John B. Lieut. R.E. (91.)
Litteldale, H. W. A. Lt. R.N. (91.)
Little, R. R. Capt. late Madras Art.
Littleton, Hon. Algernon C. Lt. R.N. (91.)
***Lloyd, Edward** Lt. 4th Punjab Cav. (91.)
Lloyd, E. M. Capt. R.E. (91.)
Lloyd, Mark Capt. (91.)
Lodder, W. W. Major-Gen. (91.)
Loftus, Douglas Lieut. late Gr. Gds.
Logan, Alfred Capt. R.A. (91.)
Long, Samuel Lt.-Col. late Gr. Gds. (91.)
Long, Samuel Capt. R.N. (91.)
***Longstaff, Lewellyn W.** Lt.-Col. 1st E. York. R.V. (91.)
Loraine, Sir Lambton, Bart. Capt. R.N. (91.)
Loraine, W. C. late I.N. (91.)
- Lowndes, James** Major Royal Renfrew Militia (91.)
Low, C. E. late Lt. I.N. (91.)
Loyd, Arthur P. Lieut. 21st Huss. (91.)
Loyd, Frank K. Lieut. 55th Regt. (91.)
Loyd, W. K. Lt.-Col. (ret.) R.A. (91.)
Lucas, H. H. late H.E.I.C.S.
Lugard, Sir Edw., GCB. Lieut.-Gen. Col. 31st Regt. (91.)
Lumsden, Henry Capt. L. Scot. R.V. (91.)
Lumsden, Sir Harry B., KCSI. CB. Gen. (91.)
Lumsden, P. S., CB. CSI. Col. Ben. S. Corps (91.)
Lyons, T. C. Col. (91.)
Lysley, W. Gerard Lieut. late Inns of Court R.V. (91.)
- *MABERLY, Evan, CB.** Maj.-Gen. R.A.
***Macaulay, G. W.** Lt.-Col. (ret.) 1st Regt. Soinde Horse (91.)
M'Call, S. Lt. late 5th Dr. Gds.
McCleverty, James Capt. 45th Regt. (91.)
McClintock, William Capt. R.A. (91.)
McDonald, Alex., MD. Surg. (h.p.)
***M'Donnel, Christopher** Maj. late 4th R. I. Dr. Gds.
Macdougall, A. H. late Roy. Archers of the Queen's Body Guard
McFarlan, J. W. Capt. and Paymaster 9th Lancers (91.)
M'Hardy, J. B. B. Admiral
M'Hardy, Wallace B. Comr. R.N. (91.)
***Mackenzie, Colin** Capt. late 78th Highlrs. (91.)
Mackenzie, Keith Stewart, of Seaforth Lt. late 90th L. I. (91.)
Mackenzie, R. S. M. Capt. R.A. (91.)
Mackeson, E. Dpty.-Lt. Tower Hamlets (91.)
Mackintosh, G. D. late Hon. Corps of Gentlemen-at-Arms
Mackirdy, D. E. Lieut.-Gen. (91.)
***Maclean, Hen. John** Lieut.-Col. Rif. Brig. (91.)
Maclean, J. L. Capt. late 69th Regt.
Maclear, J. F. L. P. Capt. R.N. (91.)
***MacLiver, David** Capt. late 2nd Somerset Mil. (91.)
McLaughlin, Charles Lieut. R.N. (91.)
McMahon, Sir Thos. W., Bart., CB. Maj.-Gen. (91.)
McNeile, Alex. Capt. (h.p.) Indian Army (91.)
McNeill, J. C., B.E. CB. CMG. Col. (h.p.) 48th Regt. (91.)
Mahon, D. Major late 98th Regt.
Mahon, H. J. Pakenham Lt. late 8th Huss.
Mainwaring, K. H. A. Capt. R.N. (91.)
Maitland, E. Major R.A. (91.)
Maitland, Fred. Thos. Col. late R.S. Corps
Malet, Sir A., Bart. Dep. Lt. of Wilts (10s.)
Maltby, G. R. Lt. R.N. (91.)
Man, J. Alexander Capt. Roy. Aberdeen High. Mil. (91.)
Manchester, W. D. Duke of, Lt.-Col. Huntingdonshire Lt. Horse Vols. (11.)
Mann, Geo. R. Ens. 1st Middx. R.V. (91.)
Mansel, J. C. Capt. late Northum. Mil.
Margary, A. R. Major late 54th Regt. (91.)

- Markham, Edwin** Lieut.-Col. R.A. (91.)
Marsh, J. C. Lory, MD. Asst. Surg. late
 Notts Mil. (91.)
Marshall, W. Dep.-Lieut. Cumb. (91.)
Maruland, Wm. E. Lt.-Col. 5th Drag. Gds.
 (91.)
Martin, F. S. late Ens. 58th Regt. (91.)
Martin, James Capt. late Rifle Brigade
Martineau, George Lt. 6th Surrey R.V. (91.)
Mason, Geo. Capt. late 4th Foot
Maseie, Watkin late Lt. Ind. Army (91.)
Masey, W. G. Dunham Col. 5th Rl. Irish
 Lancers (91.)
Matson, Henry Major late 58th Regt.
***Mayne, R. C., CB.** Capt. R.N. (91.)
Mead, J. A. R. Lt.-Col. R.A. (91.)
***Meaden, James** Maj. late Ceylon Rifles
 (91.)
Mease, Edw. Capt. H.A.C. (91.)
Meiklam, J. Lieut. late 9th Lancers
***Mein, A. Major** late 4th Lanark R.V. (91.)
Mercer, C. H. L. Lieut. R.A. (91.)
Mercer, Saml. Rear-Adm.
Merceron, Henry late H.A.C. (91.)
Mills, Richard Capt. Civil Service R.V.
***Milman, G. H. L.** Maj.-Gen. R.A. (81.)
Milne, Archd. B. Lieut. R.N. (91.)
Molyneux, A.M. Lt.-Col. late 2nd Mad. L.I.
Molyneux, A. Mitchell Capt. late 23rd
 R. W. Fus. (31.)
***Molyneux, E.** Capt. 7th Dr. Gds. (81.)
***Molyneux, W. H. Mitchell** Comr. R.N. (91.)
Monck, Hon. Henry P. C. S. Lieut.
 Cold. Gds. (91.)
Monckton, John H. Lieut. 2nd Stafford
 Mil. (91.)
Moncrieffe, Sir T., Bart. Col. Roy. Perth
 Rifles late Lt. S. F. Gds.
Montagu, Philip Lt. 31st Regt. (91.)
Montefiore, Sir Moses, Bart., FR.S. Capt.
 late Surrey Local Mil. and Depty.-Lieut.
 of Kent
***Montgomery, A. W. J.** Maj. 20th Hus. (91.)
Montgomery, C.T.M. late Lt. Gr. Gds. (91.)
Montgomery, A. J. Lieut. R.A. (91.)
Montgomery, R. A. Lieut. R.A. (91.)
Montresor, Fred. Byng Vice-Adm.
Moody, R. Clement Maj.-Gen. R.E.
Moody, Thos. B. Lieut. R.N. (91.)
Moore, J. Capt. late 30th Regt.
Morant, J. L. L. Capt. R.E. (91.)
Moreton, Aug. H.M. Capt. Cold. Gds. (91.)
Murrah, Jas. A. Capt. late Adj. 7th Depôt
 Batt.
Morris, E. Lieut. late 54th Regt.
Mortimer, H. M. Jones Lt.-Col. late
 73rd Regt. (91.)
Morton, James F. Capt. 55th Regt. (91.)
Mosce, W. Lt.-Col. (h.p.) 26th Cameronians
 (91.)
***Mount, F. J., FRCS.** D.I.G. of Hosp. (91.)
Mould, John A. D.I. Genl. of Hosps. and
 Fleets (81.)
Mould, Thos. Rawlings Major-Gen. R.E.
Mowbray, G. T. Maj. Leicester Mil. (91.)
Moyce, H. G. late Lieut. 11th Lt. Drs.
Murray, C. Wyndham Lt. 61st Regt. (91.)
Murray, Dennis, MD. Staff Surg. (h.p.)
Murray, Freeman Lieut.-Gen. (91.)
Murray, John Geo. Lieut. R.A. (91.)
Murray, Sir Patrick Keith Capt. (ret.)
 Gr. Gds. (31.)
Musgrave, Sir George, Bart. Depy.-Lieut.
 Cumberland and Westmorland
Muttlebury, J. E. Major late 3rd Buffs

NAPIER of Magdala, LORD, GCB. GCSI.
 Gen. R.E. (91.)
Napier, W. C. E. Lt.-Gen. Gov. Royal
 Military College (31.)
Naylor, Christopher J. Lt. R.N. (91.)
Neal, Wm. Capt. (ret.) 52nd L.I. (91.)
***Neave, Everard S.** Capt. Beng. S.C. (91.)
Neele, T. Clarkson late Mate R.N.
Nelson, Horatio Capt. R.N. (91.)
Netterville, A. J. Lieut. late 12th Regt.
Neville, Park Percy Lt.-Col. Hon. Corps
 Gentlemen-at-Arms
Newark, W. S., VISCOUNT Lt. Gren. Gds.
 (91.)
Newcome, G. Capt. late 47th Regt.
Newsome, W. Major R. E. (91.)
Nicholl, Edward Lt.-Col.
Nicholson, H. Whalley Capt. (ret.) 82nd
 Regt. (91.)
Nicholson, J. A. Stewart late Lt. Gr. Gds.
Nicolson, C. A. Lt. R.N. (91.)
Nixon, John Major New Zealand Mil. (91.)
Noake, Maillard Maj. New Zealand Mil.
 (91.)
Noel, G. H. U. Comr. R.N. **Sold**
Medallist, Sabal Essay, 1876 (91.)
Nokes, J. Major late 65th Regt.
Nolloth, Matthew S. Rear-Adm. (31.)
Nolloth, Peter B. Col. (ret.) R.M.L.I.
Northbrook, Right Hon. LORD, GMSI. (91.)
Northwick, LORD Col. (ret.) Herefordshire
 Mil. (31.)
Norton, Cecil W. Lt. 5th Lancers (91.)
Norton, R. T. L. Capt. late 2nd L. Gds.
Notman, H. Wilkes Capt. Lond. Scot. R.V.
 (91.)
Nugent, George Maj. (ret.) 2nd Dr. Gds.

O'CALLAGHAN, G.W. Douglas, CB. Vice-
 Admiral
Ogilvy, Wm. Major
Ollivant, E. A. Capt. R.A. (91.)
Oliver, Rd. Aldworth Rear-Adm (31.)
Olive, Ernest Llewelyn Lt. 38th Regt. (91.)
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Ommanney, Erasmus, CB. FR.S. Vice-Adm.
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German Empire.—Munster, Count, Ambassador Extraordinary & Minister Plenipotentiary.
Von Vietinghoff, Major, Military Attaché.

Italy.—Cadorna, Cavaliere Carlo, Envoy Extraordinary and Minister Plenipotentiary.
Maffei, Count, First Secretary.

Portugal.—Torcato, Le Viscomte de, Military Attaché.

Russia.—Schouvaloff, Count, Ambassador Extraordinary and Minister Plenipotentiary.
Gorloff, Major-General A., Military Attaché.

Spain.—

Sweden and Norway.—Hochschild, Baron Carl, Envoy Extraordinary and Minister Plenipotentiary.

Turkey.—H. E. Musurus Paoha, Ambassador Extraordinary and Minister Plenipotentiary.

United States of America.—The Honble. E. Pierrepont, Envoy Extraordinary and Minister Plenipotentiary.
Moran, Benjamin, Secretary of Legation.
Badeau, A., General, Consul-General.

FOREIGN OFFICERS.

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Cecille, Admiral, French Navy.	Todleben, Lieut.-General E. de Imp. Russian Service.
Da Cunha, C. P. Capt., Port. Navy.	Usedom, Baron Von.
Graham, J. D. Major, U.S. Topograph. Eng.	Wright, Lieut.-Col. Commanding 5th Prussian Dragoons.
Lampo, A. Cavaliere, Capt. Italian Navy.	
Pirche, Colonel, the Baron de, French Army.	
Roerdanz, R., Lieut.-Col. Imp. German Staff.	

CORRESPONDING MEMBERS.

Novitzky, N. de, Major-General, Aide-de-Camp to H.M. the Emperor of Russia.
Bonnevise, F. Lieut., Norwegian Royal Guard.
Ekeloff, T. A. Lieut. Royal Swedish Navy.



14



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ANOTHER WARNING VOICE FROM 1805.

By Major-General T. B. COLLINSON, R.E.

1793-1801.

The Pith of the Lesson.

In the year 1790, when the great French Revolution was beginning to look threatening to the peace of Europe, and when most other States began to get themselves into war condition in anticipation of a storm, Great Britain, that country of bold and practical minded people, disbanded the very respectable Army she then possessed, dismantled her admirable Navy, and sold her naval stores. The lion did not wait to have his claws cut, but deliberately cut them himself, and that without the excuse of one atom of love, nor even of the quiet reserve of a great heart, but simply from the exigencies of Parliamentary warfare interpreting a selfish policy of isolation. The balance of political parties in Great Britain at that time prevented the Government of the day from preparing for war, and the opposition used for their purposes the national ignorance of continental politics. There were other States in Europe which, for their own selfish interests, abstained from joining in the war against French dominion long after Great Britain had heartily begun; but Great Britain was then especially, as she is now pre-eminently, the one power, which, by her geographical position, her character and her resources, could interfere most effectually and with least danger to herself, in preventing the spread of war in Europe. Hence we must acknowledge that this laggardness of the people and opposition of the rulers in preparing to take their part at the beginning of the disturbance, has, from an historical point of view, an aspect of selfish isolation. They had had many lessons in the course of their history on evil consequences and uselessness of such a policy of separation, but they persisted in burying their heads in their island nest in the hope that the hunters would not see them, and in shutting themselves up in their stronghold in the hope that the fire raging in the town would not reach them; and the result was that they themselves afforded to

their posterity a stronger example of those consequences than any of their predecessors. A long drawn war of 20 years, and a debt of which we seem never to be relieved, was mainly the effect of their taking the course, in 1790, directly contrary to what appears now to have been the right one.

This proposition, so difficult to impress on the minds of the English people, is demonstrated, I think, with sufficient clearness in the histories of those times. From the beginning to the end of that long war, the speeches, letters, and reports of the statesmen, admirals, and generals read like one continuous commentary on the mistake of being unprepared for war at the beginning—a mistake which took 15 years of the war to rectify. The very statesmen who at first opposed the idea of interfering with the progress of the Revolution, were at last most energetic in taking those measures against it which, if adopted at the commencement, might have prevented the desolation of Europe. It is surely no excuse to say that in this long period of tribulation, the plants of a better liberty took firm root in every State, and that Great Britain reaped a harvest of glories that would never otherwise have flourished: the plain duty of a country placed in the world in the position of Great Britain, is to preserve the peace; and that is the only and sufficient argument for the maintenance of its war forces.

The form this continuous commentary took, is the best evidence of the truth of the proposition: like the repeated chorus of some song of lamentation, comes the cry of one minister after the other—O! for an expeditionary force to send on to the Continent—O! for a well equipped body of trained troops—O! for 50,000 disciplined soldiers! But 50,000 disciplined soldiers are not to be bought at Covent Garden Market every day in the week: such an article requires some years to grow in; it is a perennial plant, and the attempt to substitute for it, annuals trained by forcing to look like the real thing, may make a flower show, but produces no fruit. And so the war ministers of the day found it, one after another: for they all attempted for some years to supply the deficiency, which they all felt, by making the general Militia act the part of Regulars—an expedient which gave satisfaction to no parties concerned, except perhaps to the enemy. It was felt to be an unfair application of this old constitutional force to make it a sort of recruiting depôt for the Regulars; it was equally unfair to the Militia to expect them to do the work of regular soldiers in foreign expeditions; and to the commanders of those expeditions, to expect them to act as if their whole force was composed of equally trained soldiers. But, it will be said, the troops of the French Revolution were at that time equally untrained; that is true, but it is also true, that when there was a fair field, the French Revolutionary troops at that time were beaten; and had they been met by a properly trained force, under a good commander, the French Revolution would have been considerably curtailed in its proportions.

The first Failure.

The British people were roused from their position as indifferent

spectators in 1792, and very suddenly. In June of that year, the King dismissed Parliament without a prospect of having to disturb that position of economical isolation; in about a month afterwards, Royalty in France was put an end to, an event which touched the feelings of the English greatly, but not enough to disturb their peace. In another month, however, their pockets were touched by the occupation of Holland: and this was a blow which brought Parliament together again about six months after their peaceful separation, to re-establish the dismissed Army, to reconstruct the dismantled Navy, and to re-purchase the sold stores. The first idea on going to war was quite worthy of the bold British race, namely, to attack the enemy at once, and in the part where he had inflicted the injury on us; and the first operation of this long war was the siege of Dunkirk. This expedition is, therefore, highly interesting to us, as a pregnant example of the first performance when there was so much promise—in spirit. Time was when an expedition into France would have brought all the youth of England together as for a holiday excursion, with the prospect of successful enterprise, and the French would have remained at home in anxious preparation. In 1793 the British Government, after three weeks' labour—of which those who have been in our War Office at the outbreak of a "little war" will be able to form an idea—got together 35,000 British and Hanoverian troops, and leaving the Dutch and the other opponents of the French to their own devices, undertook this little independent operation at Dunkirk. The French already dealing with troops by the 100,000, brought a superior force upon this isolated expedition, and such was the defective condition of our Navy, that they attacked the British besieging force by sea as well as by land; and this first episode resulted in a failure to the British arms.

It was a fair example of many other such unsuccessful expeditions with which the war on land was carried on in a desultory manner for the next 15 years. All undertaken from the feeling of the necessity of attacking the enemy on his own weak points, and all failing from the want of a sufficient strength of properly trained and properly equipped soldiers. Early in the war, Mr. Pitt pointed out the necessity of so doing: "The power of Great Britain at sea, however irresistible "on that element, could not, in the nature of things, make an adequate "impression upon an enemy whose strength was concentrated on land." But the absence of the only efficient means to produce that required impression was shown by the successive attempts to modify the Militia so as to feed the regular Army with the best kind of soldiers available. They had no others, and what they had of these were so few and so unfitted for the work, that these little isolated attempts of a few thousand men at one point and another of Europe, "this warfare of pigmies," as Napoleon afterwards called it,² only encouraged the enemy and discouraged the people of Great Britain.

The Result.

In 1797, four years of this kind of warfare resulted in Great

¹ "Ann. Reg.," 1794.

² Dumas.

Britain being shut up in its own islands, with one of them in rebellion, and threatened with an invasion. It may be doubted whether the French at this period contemplated a serious invasion, but the threatening attitude they assumed had all the effect they intended, of still more discouraging Great Britain from attempting any exploits on the Continent. It was, it must be confessed, a humiliating position for this country to be placed in, and drew from Mr. Burke an eloquent denunciation of this timid and futile war policy: "Who would have credited that 200,000 men were kept in England and 80,000 in Ireland for the mere purpose of an inert and passive defence; and that by its very constitution the greater part of this force was disabled from defending us against the enemy by one preventive stroke of active hostility. And who would have believed that a fleet of 500 ships, the best appointed that this country ever had upon the sea, was for the greater part employed in the same system of unenterprising defence. What must be the feelings of those who remember the former energy of England, in seeing these two islands with their extensive sea coast treated as a garrison—and a garrison powerless to sally—allowing itself to be besieged by an inferior force and a shattered fleet—and with merely the menace of an attack?"¹

At this period, however, the British Fleet, as it had often done before, came to the rescue of the national honour. The naval victories of St. Vincent and Camperdown, in 1797, and of the Nile, in 1798, first roused the true war spirit of the people: that spirit had, however, to fall and rise several times yet before it stood at the level of steady success. Naval victories do not give permanent power, and the truth of the above warning of Mr. Pitt was shown in 1799, in a fresh expedition to Holland, and the defect of our war organisation was again shown in its failure. Once more the Navy, under Nelson, at Copenhagen, in 1801, raised the dormant war feeling, and this time the first success on land by Abercromby, in Egypt, seemed to give a prospect of a turn in the tide of war: showing that it was defect of organisation only, and not of spirit in the people, that had hitherto checked our arms on land. But the nation had not yet learnt the lesson that no amount of enthusiasm, and no dominion of the sea, will compensate for the want of deliberate preparation for war on land. This new war spirit that had arisen in Great Britain, and which in 1790 might have been effectual in preserving peace, was now overshadowed by the superior organisation that had arisen in France under the genius of Napoleon, whose moral power alone, one may say, forced England to consent to a nominal peace in 1801.

Its Lesson Lost.

Thus the first part of this great war was nominally brought to a close by this forced peace of Amiens in 1801—a peace which was no peace—a mere armed truce, for the purpose of lulling the people of Great Britain into a false security, while Napoleon was consolidating

¹ Alison, vol. iv, p. 181. 1797.

his power in Europe for the more effectual subjugation of England. For what were the respective positions of the two parties after eight years of war? Great Britain was all powerful at sea, and had gained some colonies, which were highly advantageous for the preservation of that power, and for the extension of her commerce. In consequence, indeed, of that sea dominion, her commerce had gone on increasing in a marvellous manner throughout the whole war; and she was induced to believe that it only required peace with her one great enemy to perfect that sea dominion and make her mistress of the commerce of the ocean. But the great enemy had very different intentions in his mind. He had never deviated from the ideas he had confidentially expressed in 1797: "Let us concentrate all our activity "on the marine, and destroy England; that done, Europe is at our "feet." The year before he made this hollow peace he said, "England must be overturned, war to the death with England"² And throughout all his proceedings during the peace, for extending and perfecting his control over the various countries on the Continent which had been subdued by his arms, he always kept in view the design, on the first favourable opportunity, of conquering that island-power which was the great obstacle to his supreme dominion in the western world.

And yet those same exigencies of Parliamentary warfare, which had in 1790 diverted the nation from the right view of the state of the Continent, again interfered to foster their erroneous views of sea security and unlimited commerce, and with the same result. Such Army as they had, was disbanded, the fleets were dismantled, and the ships and stores collected during the last eight years, were sold.

So difficult is it for the British mind to learn the lesson of its proper duty in the world. So ready are our people for the sake of that ocean commerce to rely on our security from the troubles of the Continent. And if the mistake of that policy were so strongly brought home to them, by the imminent danger of the next three years, how much stronger ought it to be impressed upon us in these days, when we have no longer the same security from invasion, and are infinitely more dependent on the Continent for existence.

THE PREPARATIONS IN FRANCE.

First Conception of Project.

It was in 1798 that Napoleon first had his attention turned to the idea of invading England with a large force from the coast immediately opposite to it. And whatever his real motive may have been for declining the undertaking at that time, he recorded a professional reason for doing so, which is of some value to us now; and that was, that however practicable it might be to pass over a sufficient body of men, notwithstanding the superiority of the British at sea, to make good a footing in England, it would be impossible to reinforce them.³

¹ "Confid. Corresp. de Napol." Alison, iv, 212. ² Alison, vol. iv, 220. 1800.

³ Thiers, "Consul. et l'Emp.," x, 13.

So, when he had obtained the supreme power in France, and had no other enemy to deal with but Great Britain, and he had resolved to take that opportunity of striking a decisive blow against her, he did not forget that question of reinforcement; and he swept away the difficulty with his usual force, by resolving to take over reinforcements and all at once.

There are some curious points of resemblance between this projected invasion of Napoleon and that of the Spanish Armada in 1588. Napoleon had nearly as great power in Europe as Philip II had, and at the moment England was his only enemy; he had the resources of Holland, Spain, Italy, and Switzerland, besides those of France, at his disposal; he prepared with great care during two years an enormous armada of ships and troops, and stores of all kinds; he had not the command of the sea as Philip had, but that was more than counterbalanced by his superior genius; his favourite Admiral died at the moment when all was ready, and he had to trust the pith of the expedition to an inferior man. The winds of Heaven were against him as against the Armada; but the real cause of failure was the same in both; the Franco-Spanish navy, enthusiastic and high spirited as the men were, was not a match at sea for the British sons of Neptune.

There was this further point of resemblance, that both expeditions were conceived and worked out by one man, and the real scheme of each was kept secret to the last moment. But the difference of the two men made a total difference in the character of the two expeditions, and in the two schemes. Napoleon was a soldier and a statesman of the highest genius, and fully capable of arranging the details in the most efficient manner, as well as of devising a strategic plot most calculated to ensure success, military and political. The one expedition was a "toro" in a bull ring, going at his object by brute force, the other was the "toreador," who by skill and intelligence seeks to overmaster the animal. This was very much the difference between Napoleon and his present antagonist Great Britain; to the ingenious toils of the one were opposed the unskilful courage of the other.

Napoleon began to think of the subject as soon as he had made peace with Austria in 1800, because England was the only power then likely to oppose him; and as he was not by any means prepared for such an undertaking then, he was willing to make peace with her in 1801, for the very purpose of better completing those preparations. When Great Britain herself broke the peace in 1803, he was compelled by the feeling in France to resume the project energetically, although he himself would have preferred a delay of some years to ensure a preparation sufficient for the enterprise. And when Pitt returned to office in 1804, and began to stir up Russia and Austria again to oppose him, Napoleon found it necessary to act at once, and he put his mighty shoulder to the wheel accordingly, and the machine moved.

Details of Vessels.

The whole scope of this wonderful contrivance for circumventing England will come better later on in this account; at present we shall

deal with the details of the preparations. As he could not expect to keep the command over the "narrow seas" for very long, he naturally selected the shortest passage for his troops across, and consequently he was limited in the size of the vessels he could use to those which could conveniently enter the ports in that part of the French coast immediately opposite England; then it was important that they should be movable by oars as well as sails, and be flat-bottomed, so as to be easily beached on the English coast. These were all the conditions imperative, as far as the transport of the troops was concerned; it only required the presence of a protecting fleet to complete the scheme. Napoleon's genius, as will appear further on, was shown in his plan for deceiving the British Government, and indeed everybody else as to his real plot for ensuring the passage. Instead of confining his vessels to these conditions for mere transport, he had them constructed capable of fighting their way across against men of war; and so completely did he work out this idea that nobody in England or France, except the three men in the real secret (and one British Admiral who divined it) had a notion that he had any other intention of effecting the passage, and the British Navy were most completely put on the wrong scent, until the fox was on the point of getting into the hen-roost.

With this view, he had the main body of his transport-vessels constructed of three kinds. One, a good sea boat, of as large a size as practicable, and well armed for fighting and not carrying many troops; one both a sea boat and a rowing boat, rather smaller in size, not carrying so heavy an armament, but more troops; and to each one of these two descriptions was to be attached a powerful rowing-boat also carrying troops, so that the sailing and the rowing boats were to mutually assist and protect each other. And in the disposition of the troops in the vessels, his first idea was to have some of each arm in each pair of vessels. Thus, the large gunboat, with its rowing pinnace, was to carry a company of infantry and some artillery, and horses; the small gunboat, with its pinnace, was to carry a company of infantry, a field piece with the rest of the gunners, and some cavalry and horses. Each pair of vessels was to carry a proportion of provisions (for 20 days) and military stores as well. Thus, whatever the numbers of pairs of vessels that landed on the English coast, they would find themselves with a proportion of each arm, and with ammunition and provisions.¹

This idea was so far modified, that apparently each gunboat was eventually independent of the rowing boat. According to M. Thiers (who had access to the official correspondence), the arrangement of the three kinds was as follows:

The large gunboats, or chaloupes canonnières, were brigs, with an armament of four 24- or 36-pounders, a crew of 24, and 100 infantry, besides ammunition and provisions.

There were about 320 of them.

The small gunboats, or bateaux canonnières, were barks, carrying one 24-pr., and a field-piece and ammunition waggon, all ready for action;

¹ Dumas, xii, 265.

began with that branch before the others; a precaution, for the want of which, we shall find the English Commander-in-Chief lamenting. The camps were at Ostend, Dunkirk, Ambleteuse, Boulogne, and Etaples. The troops in the two former were gradually brought to Ambleteuse, in the flotilla, as it became ready, so that all parties got *bonâ fide* experience in the work they were to do.¹ But Napoleon, like Cæsar, wished his soldiers to be capable of turning their hands to everything; he not only had them practised at embarking and disembarking, but in rowing, and working the vessels, and in using the cannons.

The fighting flotilla was organised in divisions to suit those of the Army. A battalion of infantry consisted of 800 men, and 2 battalions, made a demi-brigade; 9 large gunboats were required for a battalion, with the proportion of artillery and horses; 18 for a demi-brigade. The whole flotilla was arranged in divisions of 18 vessels; 6 such divisions, each commanded by a naval officer, with a proportion of transport boats for stores attached, formed "an escadrille" under a Post Captain. The vessels lay in harbour alongside the wharves in tiers of nine, so that each battalion could march direct to the tier it belonged to, and on to the nine vessels. And to keep up the connection between men and vessels, one-fourth of each company were kept on board their boat for a month at a time, and worked it during that time. The bulk of the stores were kept always on board; the whole force of men could embark in two hours; the horses in four or five hours; they were put in slings, and so transferred from the innermost vessel to the others.²

Remarks.

Every General is not a Napoleon; but without any disrespect to the personal qualities of our Generals, we may ask, how many of them would take an interest in, or even wish to see, their troops employed in forming basins for the Navy, or in rowing or working boats, or even in learning gun drill? How many would be prepared to make any proposition about artillery, or to discuss, like Napoleon, surrounded with scientific men of all kinds, the whole bearings of the project, naval, military, and civil? Napoleon said once, that science was superior to arms; but we appear to act sometimes in our Army nearly on the contrary supposition; we seem to think that it is sufficient for a General to know his drill, and that the soldier should practise nothing else all his life; and the result is, that we have seldom a General qualified by practice to take in the whole branches of warfare into his calculations in the way an Admiral has to do with a Fleet, and that our soldiers at the outset of a campaign are at a loss to do anything but fall in and march. The care and thought bestowed by Napoleon himself on these matters gave new feelings to his troops, and a confidence in the result of their labours they did not

¹ It appears by the table from Dumas, at the end of paper, that in July, 1805, there were still about 400 vessels at Calais, Dunkirk, and Ostend: probably store transports.

² Dumas, x and xii, 304. Thiers, iv, 486.

feel at first. We are a nation whose whole warfare is made up of such expeditions; how often do our Army and Navy rehearse together the parts they are to play so often in their lives? and yet the British soldier has quite as much time for all these things as the French soldier had, and he is better qualified by nature to rise to the occasion. Our Officers and men have, I believe, higher personal qualifications for soldiering than any other race; but these qualities are in great measure wasted by the system which tends to keep each branch of the Army within its own little groove; and we train a portion of our officers very carefully for war, and then make little or no use of this expensively educated section during the long years of peace. This adherence to the purely tactical part of the military profession is a foreign tradition, quite contrary to the English character, which of itself naturally takes the more comprehensive spirit of the sailor, and is not slow to take advantage of the science of the day. We shall never have a really English army until we enlarge our notions about the duties of the profession.

British Attacks.

The British cruisers appointed to watch all these proceedings did not allow them to go on during those two years without many attempts to stop them. Besides the constant waylaying of the flotilla as they crept, one detachment after the other, along the French shore to the rendezvous, there were several direct attacks upon them in harbour by bombardment or otherwise. Our naval Officers now would no doubt think, as they did then, that it would not be a difficult matter to destroy them in that manner, but none of the attempts at that time succeeded. Even Lord Nelson failed in two attacks on Boulogne in 1801, where there was already a portion of the flotilla collected; and the great cause of failure seemed to be the superior size of the French guns. As the British ships got bolder in their attacks, Napoleon made larger guns and mortars, and fired the guns at high angles. It is true that, now-a-days, bombardments look more hopeful with our powerful and accurate guns; but it must be recollected that the flotilla presented a fair mark even to the guns of those days; there were generally one or two hundred of them moored in the roadstead, close together, and yet, neither by French nor English account, was there much injury done to either flotilla or forts, and their close packing and other precautions saved them from several attempts at boarding. Our torpedoists will also be disappointed to hear that one or two attempts with new and ingenious machines of that kind failed completely, and not so much from any defects in the machines themselves, as from accidents of time and place and the precautions of the flotilla, to which such inventions in all ages are liable.

Upon the whole, indeed, there seems to be no doubt that the French naval and military forces felt more confidence in the prospect of success in the flotilla in 1805 than they did in 1803, and really began to believe in the possibility of forcing their way across the narrow channel in spite of the British Fleet; the Minister of Marine (Admiral Decrès) declared at last, that with the loss of about 100

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vessels and 10,000 men, the flotilla would arrive on the English shores.¹ "We must lose some men in every campaign," observed Napoleon² upon this; but these two were in the secret.

The Transit.

The arrangements for the actual transit over the strip of sea were these. On the signal being given by Napoleon, which would be towards high water time, as only half the vessels could get out in one tide, about half the number of troops would at once embark in their respective vessels, in each of the three ports of rendezvous, and lay outside off the ports till the next tide; in the meantime the horses would be put on board the transports, and at the next high water the remainder of the troops would embark, and the whole would move on at once to the appointed places on the English coast. The force from each port was to move in three lines—the large gunboats in the van line, the small gunboats in the rear, and the pinnaces in the centre. The naval Commander-in-Chief of the flotilla (Admiral Bruix at first, and, on his death, Admiral La Crosse) calculated on moving in a calm at the rate of three miles an hour, with the help of their oars; they anticipated and hoped for a calm, or even for a fog, so as to escape the British men-of-war; and they calculated on the passage, even in a calm, not occupying more than twelve hours. They were not afraid of night-time, as the troops had been practised in embarking and disembarking, and moving the vessels during the night.³

Whether such an expedition would have succeeded in reaching the English shore in the face of any respectable naval force is a doubtful question. Admiral Lord Keith, who commanded the British naval force opposed to it, thought they would never attempt it without having the command of the Channel; we know that Napoleon did not intend them to attempt it, but it seems certain that the French naval and military commanders, who were not in his secret, had made up their minds to try it, and that after some experience.

It has indeed sometimes been doubted, whether Napoleon seriously entertained the idea of invading this country—whether the whole affair was not a blind to deceive the world, including the French themselves. But I think no one can read his letters on the subject during those years, showing his earnest attention to every detail in the affair, and his anxiety when the action of the plot began, without coming to the conclusion that his mind was really set upon the attempt. But the strongest evidence of all is, that it was on the point of being completely successful; his calculations of the probabilities of success were so carefully made, that the failure was due, not to fault in the design, but to defect in execution.

Other Preparations.

The consideration of the points of attack on the English coast, and of the whole scheme, will come better in subsequent parts of the

¹ Thiers, iv, 417.

² Dumas.

³ Dumas, xii, 305, 312.

account; but we may record in this part the other preparations for the affair on the French side.

At Texel, Napoleon had compelled the Dutch to provide a war fleet, and transports and troops, which with a French contingent formed a separate expedition of about 25,000 men, prepared for long sea voyage.

At Antwerp, he had commenced the docks and quays, which were but the beginning of the great works he contemplated there and at Flushing; and no doubt if he could have postponed the attempt on England, as he wished, till these were finished, the Scheldt would have been chosen as the point of departure of a large naval and military force. As it was, the Belgians were occupied in providing part of the flotilla, which was moved to Ambletuse when ready.

At Brest, there were 21 French ships of the line and transports besides, and about 25,000 troops: forming another complete expedition for long sea voyage.

At Rochefort, there was a small squadron and a few thousand men.

At Toulon, there were 11 ships of the line and 9,000 men; and at Ferrol, Cadiz, and Carthagena, the Spaniards were bound by the treaty with Napoleon of January, 1805, to have 30 ships of the line and 5,000 troops.

It must be recollected that all these war squadrons, and their troops and transports, were blockaded in their respective ports by the British ships; and it will be seen, subsequently, that the troops at Rochefort and Toulon and part of the Spanish forces were employed in the West Indies; and that the two great expeditions of Texel and Brest never moved at all.

At the beginning of 1805, Napoleon had available, towards the invasion of England, the following land and sea forces. Of these nearly 200,000 men, about 10,000 must be deducted for the West India expedition, and 40,000 at Texel and Brest together, for whom there was not transport; leaving 150,000 who could have been embarked for the invasion.

FRENCH NAVAL AND MILITARY FORCES PREPARED TOWARDS THE INVASION OF ENGLAND, 1805.

<i>Places.</i>	<i>Troops.</i>	<i>Ships of the Line.</i>
TEXEL.....	{ French 18,000 Marsh. Marmont Dutch 12,000 ¹	Dutch 5
BREST.....	French 25,000 Genl. Angereau	French 21 Adml. Gantheaume.
ROCHEFORT.	„ 4,000	„ 6 { Adml. Missiessy. Adml. Lallemand.
FERROL	} Spanish 5,000	„ 5 Adml. Gourdon.
CADIZ.....		„ 10 Adml. Grandellana.
CARTHAGENA }		„ 14 Adml. Gravina.
		„ 6
TOLON	French 9,000	French 11 { Adm. Trevillo. Adm. Villeneuve.

¹ Dumas, x, 90.

Boulogne ..	French	{	Ambleteuse.....	23,727	Marsh. Davoust.
			Boulogne	30,627	Marsh. Soult.
			Etaples	20,527	Marsh. Ney.
			Reserve	38,801	Gen. Baraguy d'Hilliers.
			Staff and Non-combat.	9,233	

Total..... 122,915¹

Horses....	14,654	{ Officers	1,023
		{ Troops.....	6,065
		{ Artillery.....	7,566

Totals:—196,000 troops; 78 ships of the line.

THE LAND PREPARATIONS IN ENGLAND.

Unready in 1804—as in 1588.

If there were some points of resemblance between the preparations for the invasion of England in 1803 and those in 1588, there are more between the preparations for resisting it at those two epochs. The general organization of the forces of the country had been, indeed, much altered since the days of the Tudors; the permanent Royal Army had been increased, the old constitutional Militia had been put on a settled footing by Act of Parliament, and a new edition of it in the shape of Volunteers had been established; and the whole was placed much more under the central authority of the Government. But there was just the same blindness to the danger in the Government itself, the same mistaken parsimony and the same bewildering fuss when the supreme moment arrived. There was, indeed, the same enthusiasm in the country; at the first sound of the trumpet of victory the English war-spirit broke forth, as it did in the days of Elizabeth; but the very centralising of the authority, which ought to have led that enthusiasm, by its own supineness wasted it away. The counties were ready to act as ever, but they had no longer that spring of local power to act: the men of Kent had no longer the responsibility of defending Kent. It was a better system, no doubt, to have a powerful central authority, but that authority having failed to do its duty, as in 1588, there was no independent local action to fill the gap as in those days.

Now this is not merely a question of historical interest; we have a much more serious concern in it, for the same defects still exist and

¹ Dumas, xii, 33, but an actual "state" of those embarked, at page 304, gives the following:—

"Embarqués."

Infantry	76,728
Cavalry.....	11,640
Artillery	7,560
Non-combatants	17,476

114,554

Horses 7,394

M. Thiers, iv, 488, gives the field guns as 400.

will lead to the same imminent danger in the next great war we are engaged in. We have gone on improving the condition of the permanent Royal Army, and elaborating a system on paper, and at the same time we have been accumulating more and more power in the central Government, and more and more sapping that local spirit which is after all the essence of English action. And this has resulted from the form of Parliamentary Government now existing in this country: not indeed directly, because in all civil questions that come before Parliament, the importance of local government is always strongly insisted on, but the jealousy of Parliament has prevented any Government from ever trying to put the system of defence of the country on a broader, more permanent, and more local, and therefore more national, basis, although a proper system of that kind would on the whole tend to deprive the central Government of some of the military power they have now got possession of.

The defensive measures began in England at the same time that the Revolutionary Government in France began to threaten them with invasion. Neither side appeared to be very much in earnest in the matter: the French apparently did not care to do more than make desultory descents upon Ireland and England, and the English felt so confident in the naval guard they kept on the narrow seas, that they did little on land but call out the Militia and arm the old existing coast batteries; and under the reactionary influence that brought about the peace of 1801, even this small expense was economized. The trained troops were disbanded, the guns and stores sold, and the ships paid off, which had been slowly accumulated during the eight years of war, and all in order that the Government of the day should gain popularity by reducing the estimates. Very heavily we are paying for that one year's popularity.

Very different was the feeling twelve months after, when the terrible Napoleon, who now directed the energies of France, and who had struck down one enemy after the other on the continent, now turned the undivided forces of his genius and of his kingdom upon what was known to be his most ardent desire—the crushing of England by one overwhelming blow. The popular Government of peace was speedily dismissed to make way for the only man who was felt to be a match for the dreaded enemy, William Pitt. And in 1803, after a peace of Great Britain's own making and own breaking, the country had to begin almost *de novo* in creating a fleet and an army and defences, with the foe looking in at the gate. That the country escaped being conquered was no merit of that popular Government, nor of the Parliament; it was due under God's Providence to national characteristics, which from time to time save England in spite of Governments.

The Six War Departments.

I cannot but congratulate His Royal Highness the present Commander-in-Chief. The record of all these struggles to get ready for the impending blow is contained in the correspondence of the various departments concerned. I have been allowed to look over some of the

records left by his illustrious predecessor the Duke of York ; and I cannot but congratulate His Royal Highness that he has but a Secretary of State to deal with, and that in peace, instead of the task of his royal uncle, who had six different independent departments of the Government to consult, in face of a war *à l'outrance*. There was the Colonial Minister, who guided the general operations of the war ; the Secretary at War, who raised the forces ; the Master-General of the Ordnance, who provided the war stores and commanded the artillery and engineers ; the Treasury, who provided the supplies ; the Home Office, who controlled the reserve forces ; and the Admiralty, who conducted the naval defence. The Commander-in-Chief and his Generals of districts might propose plans of defence ; but any one of these political chiefs might upset the whole by putting in or leaving out his own little independent spoke. If a coast battery was to be altered, the proposition must be submitted through the General of the district to the Commander-in-Chief for his general approval ; to the Master-General for the guns ; to the Secretary at War for the pay of the gunners ; to the Treasury for their food ; and to the Admiralty for the coast signal. That any defences were ready by 1805 is in itself a memorial of the energy of the British character which could overcome so cumbrous a machine of war.

The machine still exists. It has been put together in a new form, in one large case, and labelled WAR DEPARTMENT ; and many people believe it to be an entirely new engine, capable of being set in motion by one person. It does very well for show in peace time, but try to set it to work for any practical purpose, and it will be found that the old limbs are there still with the rust of ages on them, and particularly stiff in their connecting joints. And the most curious arrangement about this old machine for a practical people, as we profess to be, is that the man who has to work it, is specially selected on account of his total ignorance of its details, and in order to insure inexperience, he is changed at uncertain times. I am not thinking of the permanent officials in thus speaking of the War Department, I know well how hard they work for the nation ; it is the Government and Parliament, who are to blame, who being responsible to the country for providing an efficient war machine, allow this overworked old affair to go on.

The Force Available.

Throughout 1803 we find from the records that the Commander-in-Chief and his Generals were occupied in discussing a scheme of defence ; about the middle of it, he expressed a confident hope that there would shortly be devised some means of impeding the enemy from advancing into the country ; what then we may ask had the six independent departments been about, when after eight years of expectation of invasion, the Commander-in-Chief of the land forces, is still in an attitude of doubt as to the defence ? In October of that year His Royal Highness made a general report to the Government on the scheme of defence he proposed : and this document is well worthy of the attention of all future defenders of the country ; for though many of the conditions are quite altered, the local peculiarities

and the general principles remain the same. He calculated on having, in 1803, and he actually had in 1805, at his disposal for the defence of the United Kingdom, about the following force:¹

	Regulars.	Militia.	Volunteers.	Sea Fencibles.
In Great Britain and the Channel Islands.....	70,000	56,000	330,000	16,000
In Ireland	25,000	25,000	..	10,000
Total.....	95,000	81,000	330,000	26,000
Total 526,000				

There were then in the East Indies and in the Colonies about 50,000 regulars and Colonial corps.

The Commander-in-Chief had, therefore, for the defence of Great Britain (as the troops in Ireland could not be removed under the circumstances) about 126,000 of what in the loose military ideas of that day, they called Regulars, that is to say regular Army and Militia. He wanted 20,000 more, and 20,000 on the top of that, for the expeditionary corps which never was ready to start: not a very extravagant demand considering the character of the troops, and the character of the 180,000 Napoleon had available to bring against him. The Militia had been embodied during the previous eight years, and had been considered as the legitimate reserve and feeder of the permanent Army; and there was therefore not much difference between them: few of them had seen real war, or had any experience out of the United Kingdom. Hitherto the country had depended mainly for its land forces on the voluntary recruiting for the regular Army and on the old constitutional Militia: and the insufficiency of this provision for the defence of the country, may be judged from these comparative statements: From 1783 to 1800 the regular British Army had had about $\frac{1}{100}$ of the whole population of the kingdom *per annum*:² during the same time the French Army had taken about $\frac{1}{100}$ of their population *per annum*,³ or nearly the whole such population of 20 years of age each year: and at the present day the Prussians take in *peace time per annum* $\frac{1}{300}$ of their whole population for their regular army.

But in 1803-4 the Volunteer force, which had hitherto existed rather on sufferance, took a prominent and permanent position in the defensive elements. Now, the very existence of such a body, rising up

¹ At the end of the paper are tables showing the actual strength of the different forces and their disposition. I have not been able to get that of the Volunteers later than 1803; the number in 1805 was greater. Alison ("Hist. Europe") says in 1804 there were 190,000 regulars (including those abroad), 110,000 militia, and 400,000 volunteers; the highest numbers of forces of all kinds I find mentioned during that war were 800,000.

² Alison, iv, 212.

³ Alison, i, 356; vi, 411.

* "The Military Forces of Great Britain," by Major-General Sir L. Simmons, 1871.

a crew of only 6, and 100 infantry, or artillery or cavalry, and 2 horses, besides ammunition and provisions.

There were about 550 of these.

The *pinnaces*, or *péniches*, were 60 feet long, and had, according to M. Thiers, 60 oars, but, according to Dumas, 18 banks or thwarts of oars, which is more likely, and only a few sailors, 60 soldiers, a howitzer, and a small field-piece.

There were about 320 of these.¹

Besides the above, which were considered as the fighting part of the flotilla, there were nearly 500 vessels for carrying the remainder of the horses and artillery, including a siege-train, and nearly 500 vessels for carrying the rest of the provisions (for 3 months for the whole force) and stores, and non-combatants. There were altogether about 2,300 vessels in the flotilla. Most of the fighting portion of the flotilla were constructed, the others were purchased from the local fishing trade. There are two tables from Dumas at the end of this paper, giving the details of the whole flotilla.

Difficulties of Assemblage.

The construction and assemblage of all these vessels, within a few months as was intended, was not done by a stroke of a pen like an English contract now-a-days. Timber had to be felled and converted all over France and Belgium, naval stores to be made and purchased, and these materials collected within waterway of the ports. By stirring the old feeling of France against England, Napoleon got many of the cities to make vessels at their own expense; his correspondence at this period contains an amount of detail on all these matters, that shows at once what a master mind was guiding the whole, and how little local independence there was.²

The worst part of the business was moving them when ready to the appointed places of rendezvous along the coast infested with those hornets of British cruisers. These places of rendezvous were Boulogne, the centre and principal, with Ambleteuse and Vimereux north of it, and Etaples south of it. They were selected from being the first ports south of Cape Grisnez, and being opposite the south coast of England at the narrow part of the Channel. It was indispensable that the whole flotilla should be assembled so close together as to be certain of starting simultaneously. The vessels had to come from all the ports as far as the Scheldt on one side and Brest on the other; and the systematic arrangements for their safe conduct deserve our notice, as examples of coast defence. Besides permanent batteries on all the headlands of the coast, field batteries of even 16-pounders were stationed at intervals, which followed the detachments of vessels along the shore. The French coast generally is favourable for the manœuvre, being shallow and sandy; and the flotilla being of light draught could keep under the guns on shore, and out of range of the large English vessels, and even beach if necessary. The attempts of the watchful British cruisers, under Sir Sydney Smith, to prevent this movement,

¹ Thiers, iv, 414. Dumas, xii, 304.

² Dumas.

formed a series of little sea episodes during those two years; but though they also had some vessels of light draught, they did not succeed in materially interrupting the gradual assemblage of the flotilla; and the failure was owing chiefly to the heavier guns of the French, a point Napoleon had pressed on his own artillery. Heavy guns in coast batteries is the moral of that story.¹

But perhaps the most remarkable part of the whole preparations, to an English mind, was the enlargement of the several harbours of rendezvous to hold the flotilla. In England, if such a proposition had not stopped the scheme altogether, it would certainly have been done by contract at a huge expense; Napoleon made the troops who were to embark form the harbours for the flotilla they were to embark in. Timber was felled in the neighbouring forests to make quays and piers, and the excavation was done by relays of soldiers, under the directions of the scientific engineers of France. The sea defences of each post were multiplied so as to make an attack from the sea hopeless, and heavier guns were expressly made by Napoleon's order for them; to get range, mortars were laid on the sand between high and low water, so that they were covered by the tide; at Boulogne alone there were 500 guns in sea batteries; we have few places now with so many.²

The French Troops.

The troops employed by Napoleon on this great enterprise were selected from those available in France. In 1803, he had altogether an army of about 480,000,³ and, as he was at peace with the rest of the world, he calculated on being able to allot 150,000 altogether to assist towards the invasion of England; but with his usual prevision he took special means to keep up and even increase the strength. His measures for recruiting his army, and their effect on France, are not encouraging towards compulsory service. The population of France about that time was nearly 30,000,000,⁴ and by the laws of conscription which then existed he was at liberty to take 60,000 men of 20 years of age every year, in war time;⁵ but, of course, he easily evaded this restriction, and during his reign he took on the average 200,000 per annum, which was then the whole number of 20 years of age in each year,⁶ a drain which must have materially assisted in producing the fact that the population of France has not increased since that time at the rate of the English population. We pay heavily for our Army, it is true; but a nation can recover from a money expenditure much easier than from the loss of its young men.

Napoleon formed camps near the ports where the flotilla was preparing, for the double object of assisting in the work and re-organising the French Army, which now for the first time was arranged in permanent divisions, with a permanent staff over each.⁷ And knowing from his own education the necessity of careful training for the artillery, he

¹ Dumas. James.

² Thiers, iv.

³ Thiers, iv.

⁴ Dumas.

⁵ Thiers, iv. Dumas, xii.

⁶ Statesman's Year Book.

⁷ Alison, v, 411.

began with that branch before the others; a precaution, for the want of which, we shall find the English Commander-in-Chief lamenting. The camps were at Ostend, Dunkirk, Ambleteuse, Boulogne, and Etaples. The troops in the two former were gradually brought to Ambleteuse, in the flotilla, as it became ready, so that all parties got *bonâ fide* experience in the work they were to do.¹ But Napoleon, like Cæsar, wished his soldiers to be capable of turning their hands to everything; he not only had them practised at embarking and disembarking, but in rowing, and working the vessels, and in using the cannons.

The fighting flotilla was organised in divisions to suit those of the Army. A battalion of infantry consisted of 800 men, and 2 battalions, made a demi-brigade; 9 large gunboats were required for a battalion, with the proportion of artillery and horses; 18 for a demi-brigade. The whole flotilla was arranged in divisions of 18 vessels; 6 such divisions, each commanded by a naval officer, with a proportion of transport boats for stores attached, formed "an escadrille" under a Post Captain. The vessels lay in harbour alongside the wharves in tiers of nine, so that each battalion could march direct to the tier it belonged to, and on to the nine vessels. And to keep up the connection between men and vessels, one-fourth of each company were kept on board their boat for a month at a time, and worked it during that time. The bulk of the stores were kept always on board; the whole force of men could embark in two hours; the horses in four or five hours; they were put in slings, and so transferred from the innermost vessel to the others.²

Remarks.

Every General is not a Napoleon; but without any disrespect to the personal qualities of our Generals, we may ask, how many of them would take an interest in, or even wish to see, their troops employed in forming basins for the Navy, or in rowing or working boats, or even in learning gun drill? How many would be prepared to make any proposition about artillery, or to discuss, like Napoleon, surrounded with scientific men of all kinds, the whole bearings of the project, naval, military, and civil? Napoleon said once, that science was superior to arms; but we appear to act sometimes in our Army nearly on the contrary supposition; we seem to think that it is sufficient for a General to know his drill, and that the soldier should practise nothing else all his life; and the result is, that we have seldom a General qualified by practice to take in the whole branches of warfare into his calculations in the way an Admiral has to do with a Fleet, and that our soldiers at the outset of a campaign are at a loss to do anything but fall in and march. The care and thought bestowed by Napoleon himself on these matters gave new feelings to his troops, and a confidence in the result of their labours they did not

¹ It appears by the table from Dumas, at the end of paper, that in July, 1805, there were still about 400 vessels at Calais, Dunkirk, and Ostend: probably store transports.

² Dumas, x and xii, 304. Thiers, iv, 486.

feel at first. We are a nation whose whole warfare is made up of such expeditions; how often do our Army and Navy rehearse together the parts they are to play so often in their lives? and yet the British soldier has quite as much time for all these things as the French soldier had, and he is better qualified by nature to rise to the occasion. Our Officers and men have, I believe, higher personal qualifications for soldiering than any other race; but these qualities are in great measure wasted by the system which tends to keep each branch of the Army within its own little groove; and we train a portion of our officers very carefully for war, and then make little or no use of this expensively educated section during the long years of peace. This adherence to the purely tactical part of the military profession is a foreign tradition, quite contrary to the English character, which of itself naturally takes the more comprehensive spirit of the sailor, and is not slow to take advantage of the science of the day. We shall never have a really English army until we enlarge our notions about the duties of the profession.

British Attacks.

The British cruizers appointed to watch all these proceedings did not allow them to go on during those two years without many attempts to stop them. Besides the constant waylaying of the flotilla as they crept, one detachment after the other, along the French shore to the rendezvous, there were several direct attacks upon them in harbour by bombardment or otherwise. Our naval Officers now would no doubt think, as they did then, that it would not be a difficult matter to destroy them in that manner, but none of the attempts at that time succeeded. Even Lord Nelson failed in two attacks on Boulogne in 1801, where there was already a portion of the flotilla collected; and the great cause of failure seemed to be the superior size of the French guns. As the British ships got bolder in their attacks, Napoleon made larger guns and mortars, and fired the guns at high angles. It is true that, now-a-days, bombardments look more hopeful with our powerful and accurate guns; but it must be recollected that the flotilla presented a fair mark even to the guns of those days; there were generally one or two hundred of them moored in the roadstead, close together, and yet, neither by French nor English account, was there much injury done to either flotilla or forts, and their close packing and other precautions saved them from several attempts at boarding. Our torpedoists will also be disappointed to hear that one or two attempts with new and ingenious machines of that kind failed completely, and not so much from any defects in the machines themselves, as from accidents of time and place and the precautions of the flotilla, to which such inventions in all ages are liable.

Upon the whole, indeed, there seems to be no doubt that the French naval and military forces felt more confidence in the prospect of success in the flotilla in 1805 than they did in 1803, and really began to believe in the possibility of forcing their way across the narrow channel in spite of the British Fleet; the Minister of Marine (Admiral Decrès) declared at last, that with the loss of about 100

spontaneously as it did at the beginning of the war, was a moral force such as few countries have been fortunate enough to possess. The mighty Napoleon was trying at this very time, in 1803, to rouse artificially in France that spirit, which in England was almost overpowering in its free growth. The Volunteers had as yet been only a comparatively small supplement to the Militia; but in 1803 the Government being frightened not out of their wits, but into them, then commenced that series of experiments, which continued up to 1812, on the raising of a British army, and which will be found a mine of study to the inventors of such schemes at the present day. It was the first of these, an attempt to raise a sort of *levy en masse* of the country, that drove the whole of those liable to its operations in a body into the ranks of the Volunteers. Thus these 330,000 recruits, who had suddenly sprung out of the ground, were, though equally enthusiastic, of a different character to those which had gradually grown on to the Militia, and the Commander-in-Chief very properly did not trust very much to their assistance in his scheme of defence.

And unless we alter our ideas upon the subject of Great Britain's war requirements very considerably, this is precisely the general character of the force which the future Commander-in-Chief will have to deal with in preparing to defend the country against future invasion. A few Regulars, a partially trained and hurriedly increased Militia, and a vast crowd of Volunteers. Whether the 150,000 experienced soldiers of Napoleon would have forced their way through those spirited defenders of their country up to London, is a problem we can only approximate to, by considering the advance of the Prussian Army, in 1870, through the whole French regular army and over a distance three times that of London from the coast, up to Paris. As we did in 1588, as we did in 1797, as we did in 1803, so are we doing now; we are trusting entirely to that one line of defence, the guarding of a narrow strait of sea by our ships. We have really at the present time no arrangement at all for increasing largely and at once the number of regular troops in the United Kingdom, any more than we had at any one of the times above mentioned: and yet that was felt at each of the epochs to be the one effectual security against such a fearful danger.

The Commander-in-Chief's Report.

In considering the defence of the Kingdom in 1803, the Commander-in-Chief took the coast between Norfolk and Portsmouth, as the most vulnerable part—it must be remembered that the threatened points of departure of the invader extended from Texel to Brest—and that the kind of vessels constructed for the great French flotilla, implied a short passage. He then describes the numerous practicable places for the enemy's landing on that coast: and lays down the maxim, far more applicable now than then, that "The period of "the enemy's greatest weakness would be that of his landing:" and in order to take advantage of this weak moment, he proposes to distribute part of what he calls his regular forces, that is of the 126,000 above mentioned, in camps along the coast within easy march of

it; the volunteers of the counties concerned to proceed on the appearance of the enemy to reinforce these regulars. He then discusses the possible advance of the enemy from some point of this vulnerable coast upon London; for he assumes, as almost every military man, either invader or defender of England, has assumed, that the object of the enemy would be to reach London by the shortest possible line, without turning aside for any purpose if he could help it. And he draws attention to the serious danger, which still remains as a matter of very great concern in our defensive system, that there are no good natural positions between this vulnerable coast line and the capital, on which a decisive battle could be fought with advantage: hence he argues on the necessity of strengthening artificially such as do exist, in order to gain time for the forces to accumulate to oppose the enemy's advance. The tremendous difficulty of the problem was to him, as it is still, in the "dangerous proximity of the capital to the coast." And he saw no way of escaping the risk of losing the capital, but by intrenching and defending it.

Napoleon's Plan of Attack.

The weak part of this system of defence appears to be in scattering the regulars too much: as the whole defence depended on them. The general principle was that the regulars were to remain in their districts, and the volunteers were to march to reinforce them: the whole concentrating towards London. But as the volunteers were not to move until the enemy appeared, the commander must have had little notion of Napoleon's speed of movement if he expected to have time to assemble them between the coast and the capital, in a position to oppose him.¹ An inspection of the map accompanying this paper will show how very much scattered the English land forces were just before the expected invasion.² We have no authoritative account of the lines of attack on which Napoleon proposed to move: but we know that he asked for the command of the channel for only six days,³ and said that he would be in London in five days,⁴ and that his naval officers calculated on performing the passage by rowing the boats of the flotilla in twelve hours at the utmost, and that 120,000 men could have been carried in the flotilla; hence we may conclude that the mass of his forces were to be landed on the coasts of Kent and Sussex. This is confirmed by

¹ The rate of march for the troops from inland, mounted on waggons, was calculated at 25 miles a day; and it was expected that the volunteers who assembled at Leicester would be in London in seven days from the first alarm of the enemy's appearance.

² In the scheme for the Mobilisation of the Army, which was published in the Army List for December, 1875, this defect has been avoided. The bulk of the Regular forces and of the Militia, are to be concentrated at certain fixed places in the United Kingdom, in war time, and formed into eight army corps, together constituting the movable army for the internal defence of the kingdom: and the bulk of the Volunteers are to form the stationary garrisons for the permanent defensive works.

³ Dumas.

⁴ Alison, v, 150, quoting Montholon.

a French map of the channel which I have seen, and which indicates six places of landing on those coasts, viz., Brighton, Newhaven, Hastings, Shorncliffe, Dover, and Deal, with routes from each to London. Other landing places are marked at Swanage (west of the Isle of Wight), in the Bristol Channel, and at Harwich on the east coast, with routes also up to London; but these would probably be the feints to be made by detachments from the fleets at Brest and Texel. If the main body were really to land at these six places, then following the ideas expressed by Napoleon himself of securing one of his flanks on the Thames, they would probably have advanced in echelon from the right, and thus have prevented both their flanks from being turned. The above map, by the references on it, evidently was connected with the scheme of invasion at that period.¹

Fortifications and Guns.

The fortifications of the south and east parts of England were in a wretched condition for a country to go to war with. The fortifications enclosing Portsmouth existed, and those enclosing Portsea were completed or nearly so; and Blockhouse Fort, Southsea Castle, and some coast batteries in Stokes Bay. At Dover the Castle, the citadel on the western heights, and some sea batteries existed. At Chatham one or two of the small forts on the lines only existed. At Sheerness Garrison Point was fortified, and on the Thames, Tilbury Fort and two or three batteries below it were all the defences. On the coast between these places and up north to Yarmouth, there were batteries which had been constructed since 1793: but these and the whole of the other works had been partly dismantled during the short lived peace of 1802. As to the rest of the coast of Great Britain in 1803, there was not a general from the north of Scotland down to Land's End who did not write to represent the defenceless state of his district.

Mr. Pitt, in 1804 (when he returned to office), like Lord Palmerston, in 1859, gave a new start to the fortifications of the country. About that period were commenced at Portsmouth the Gosport Lines, the Hilsea Lines, Fort Monckton, and Fort Cumberland. At Dover the lines on the western heights were constructed as field works. At Chatham also the lines were made as field works, and one or two of the detached forts commenced. And the lines at Sheerness. Along the coast between Portsmouth and Yarmouth, those extensive series of Martello towers and coast batteries now existing were begun. At Plymouth, the lines round the dockyard were made as field works, and field redoubts constructed on the neighbouring sea heights; the citadel and some of the sea batteries existed before.

But not many of these works were ready to resist the attack if it had been made in 1805; indeed, the towers on the east coast were not begun till 1808; and the deficiency of guns was loudly complained of. The inadequate ideas on this subject might be judged from the total

¹ The points of debarkation and the routes to London as shown on that map are marked on the map accompanying this paper.

number of garrison guns (from 42 to 6 pounders) in fortresses and batteries between Sheerness and Dungeness, including Dover, in 1803, being 335, and with only 30 rounds per gun of ammunition: Napoleon having 500 garrison guns at Boulogne alone. Also that the Commander-in-Chief in 1803 calculated on having 480 field guns available for the defence of the whole of Great Britain, with 150 rounds per gun: Napoleon having 400 ready to embark in his flotilla, besides some 2,000 pieces belonging to the vessels themselves. And the reserve of small arm ammunition in the fortresses and fixed camps was at the rate of 60 rounds ahead for about 230,000 men. Lord Chatham (Master-General of the Ordnance in 1803) ingenuously remarks that he could supply the guns, but the difficulty was to get gunners, officers, and horses, and seems to think it a satisfactory explanation to say that "goodwill and numbers will not supply the "qualities necessary in artillery:" it would have been rather more so if that undisputed truth had been taken into account in 1790. And to the Commander-in-Chief's reiterated representations of the want of proper fortifications for the arsenals and dockyards, he returns the regular answer, which has been handed down among other parts of the old machine, "it has been referred to a committee." One can fancy the committee sitting steadily through the crisis, and making a most valuable report when it was all over. As to the entrenchments for strengthening the various positions between the coast and the capital, selected for making a stand at, except the two camps now existing at Colchester and Shorncliffe, and a position at Chelmsford, I cannot find that anything was done at all; except, indeed, a brisk correspondence as to whether it was the duty of the Commander-in-Chief or the Master-General of the Ordnance to make them.

We are now in a better condition as regards the defence of our naval arsenals, thanks to Lord Palmerston; but the coast line, especially that "vulnerable coast line" and the mercantile harbours, are not much better on the whole now than they were then: the batteries and guns for the most part are almost as obsolete as if those of 1805 still remained. On the east coast particularly, that coast which was directly threatened by Napoleon's Texel expedition, and opposite which a possibly new enemy has sprung up since his day, the towers and batteries of 1808 are still the main defence, and as regards the guns of the present day, are almost as they were left in 1812. Remember the two morals on this subject, one from England and the other from France:—"The period of the enemy's greatest weakness "is that of his landing:" and "les bâtimens Anglais furent contrains "de tenir le large—par l'effet des pièces de fort calibre."

The Defence of London.

The project for defending London included Highgate on the north, and Sydenham and Woolwich on the south, and had a circuit of 46 miles—a large scheme for that day. But when we learn that 170,000 men were considered as the necessary garrison, that the greater part

¹ Dumas, xii, 42.

of them were to be furnished by London itself, and that the entrenchments were to be made in a few days, after the landing of the enemy, one begins to doubt whether it was seriously intended to carry out such a project, which would hardly have delayed the capture of the capital for a day. That was all, however, the Commander-in-Chief could hope to do,—to put as much obstruction as possible in the direct way of the enemy—between him and the great prize he sought. And this must be the principle of all projects of defence of the Kingdom: so that on whatever point of the coast an enemy may land, it will be certain that he will have to fight his way through a succession of obstacles up to London, the last and greatest of all being close to the capital itself. Mr. Pitt saw that. In discussing the defence in Parliament at this time, he said: "It is in vain to say you should not fortify London because your ancestors did not. If, by the erection of works such as I am recommending, you can delay the progress of the enemy for three days, it may make the difference between the safety or the destruction of the capital. It will not make the difference between the conquest and the independence of this country; for that will not depend upon one nor upon ten battles: but it makes the difference between the loss of thousands of lives and millions of property, and of confounding the efforts and causing failure in the enterprise of the enemy." Napoleon saw it, for on the map I have mentioned before, there is an entrenched camp marked on the north side of London, from which he intended to defend his prize: and long after, at St. Helena, in discussing the general question of fortifying capitals, he said: "A great capital is the country of the flower of the nation; it is the centre of opinion, the general dépôt: it is the greatest of all contradictions to leave a point of such importance without means of immediate defence." And he enumerates the rapid conquests he made of Austria, Prussia, and Spain, owing mainly to the defenceless state of their capitals at the time; and the loss of his own kingdom, in 1814, from the same cause; to which we may now add, its protracted defence in 1870, in consequence of the deliberate adoption of his advice in time of profound peace.

Other Preparations.

Several other points of great importance in the defence of the country are discussed in the Commander-in-Chief's correspondence. *The removal of the inhabitants from the coast, and the removal or destruction of live and dead stock*, is a very serious question: though full regulations were laid down at the time about it, on the whole it was left to be carried out too much at the last moment. Some steps towards it ought to be taken always on declaration of war. Napoleon trusted much to capturing a large number of horses in England.

The accumulation of provisions at the central points of assembly of the forces, though much considered, was not sufficiently provided for, judging by the reports of some generals; too much dependence was apparently placed on local resources, especially on village ovens for

¹ Alison, v, 160.

² Alison, v, 161.

baking bread. As all property taken for the use of the troops, or destroyed on advance of the enemy, was to be paid for by the Government, at fair rates, it would have been better, on both counts, to have made depôts of live and dead stock at central points on declaration of war, and to have fed the forces from them, replenishing them from the coast. We shall see further on Napoleon's opinion as to false economy on this head.

Depôts of Military Stores, at the central points, do not appear to have been sufficiently attended to; the arsenals and fortresses were depended on for these articles. But those places would have quite enough to do in issuing stores in bulk, without having to deal with troops in detail. And if the formation of such temporary depôts is left to the time of imminent danger, there will be the confusion and waste, such as has happened on more than one occasion since those days. The first thing Napoleon began with was the depôts for artillery and military stores.

Corps of local Pioneers were established all round the coast; and the correspondence shows how much impressed the Commander-in-Chief and his generals were with the importance of such local bodies, for assisting in forming entrenchments, in making and destroying roads and bridges, inundating marshes, &c. The Railway Engineer Corps was intended partly to supply this want at the present day; but however valuable and indispensable such a corps would be for special works, it is to the local corps of Volunteer Engineers we must look for the chief assistance in this respect. But if these corps are to take the place of those pioneers, who were so much in demand in 1803, they should be practised in their own localities on the description of work they will have to do, and not treated as ordinary infantry volunteers.

Remarks.

The whole of this part of the story may be in effect summed up in these words: "*Great Britain declared war first, and then began to think about preparing for it afterwards.*" Not the first nor the last time she has done so; the old story was precisely repeated in 1854. There was plenty of energy in 1803 when they did begin to prepare, no lack of war enthusiasm everywhere, but the alarming feature of it all, the terrible tone that pervaded it throughout, was that it had to be done as it were under fire, in presence of the enemy. While Napoleon's single genius was rapidly arranging his forces for action, the British war authorities were still discussing what system of defence they should make, and the British Parliament was fighting about the general principles on which the forces should be recruited. It was not the want of warlike spirit; there were 7 or 800,000 men under arms, almost every man of whom had enlisted of his own free will; but not one quarter of them knew anything of drill or discipline. And nothing had been settled as to the positions they were to occupy or how they were to get there, or how to be provisioned when they got there; no defences had been prepared, no guns mounted. When Napoleon calculated on the disaffection of a large

portion of the English people to their constitution he showed how little a foreigner, even of the highest intelligence, understands our national character; but when he prophesied the indecision and confusion of the British Government, he laid bare the weak point of the country, of which future enemies may still take advantage.

For the indecision as to our war policy exists still, and therefore the confusion that will arise on a declaration of war may be confidently foretold. We have been told lately by a high political authority that the old maxim, *si vis pacem para bellum*, is now to be interpreted, "If you wish for peace, prepare for peace." If that means that you are to make no preparation for war whatever, then that was exactly what happened in 1793 and 1803, with a result each time not encouraging to that interpretation. But if it means that you are to make every requisite preparation to defend yourself when and wherever you are attacked, then that is exactly the interpretation I should wish the British Government to give to the old Latin proverb.

We are not so prepared at present. Our present condition, from a war point of view, as compared with 1803, may be generally stated thus: our external cares and liabilities have multiplied manifold; we have more dependencies to look after, much more ocean wealth exposed to attack, very much greater dependency on foreign food; and we are more liable to invasion. These are all against us. On the other hand, we have double the population, with probably double the wealth per head, and improved weapons to defend ourselves with. Upon the whole, it must be allowed that our general condition is *less secure* from vital injury by an enemy than in 1805; and an evidence of it appears in the successive panics that come over the country upon every threat of war. Well did the Duke of York demonstrate this when he said of the state of affairs in 1803: "A panic generally arises from a danger which has not been foreseen. A high-spirited people never despond when they feel themselves possessed of the means of resistance." If this view of our position is correct, as I think it could be shown to be by details, our preparations for securing our position ought to be so much the more carefully made beforehand.

Our Present Land Forces.

Now, in the first place, what land forces have we actually available? The whole of our peace establishment of all ranks and all kinds, and to defend all parts of our empire, is, according to the Statesman's Year Book of 1875, about 500,000. This number, in proportion to population, is about one-third of the maximum number of all sorts, raised to defend our then empire during the war of the French Revolution. Where are the other two-thirds to come from in case of war? Recollect, we are in a worse general position as regards an enemy than at that time; we therefore cannot do with less than the same proportion of land forces in war. Indeed, when we consider the character of the change in our position, that a material part of it consists in more distant and extended responsibilities over the world, we must expect to require a greater proportion to population than was

required in 1805. Then, again, consider the character of the forces. About 200,000 out of the 500,000 are regular troops, belonging to the Queen's permanent Army; better drilled, better disciplined, and better conditioned altogether than what were called Regulars in 1805. We have, therefore, as regards the regular troops, an advantage in quality, and not so great a disproportion in quantity. But there is another standard for armies to be considered besides population, and that is, the force the enemy is likely to bring against you; and it will be found, on consideration of the present standing armies of Europe, as compared with those of the Great Napoleon's days, that they have not only doubled in strength, and have also improved in drill and discipline, but that far more effective and sure means are now taken to increase those numbers of trained troops rapidly and largely in war.

What measures have we now for increasing rapidly and largely those 200,000 regulars? I don't think it is putting the case too strongly to say, that we have absolutely none worth mentioning. There is a so-called Army Reserve. I wish to speak with respect of the attempts by Lord Cardwell to improve our Army; there are two of his measures which bear upon this part of my subject—the Army Reserve and the Localisation. But when one hears of 30,000 as a high result anticipated from the first, one is reminded of a former Army Reserve in 1803, of which Mr. Windham said, in 1805, that it was “like a turnpike gate which men were paid to go *through*, and no more made an army than the lobby of the House of Commons made the members. . . . It was like Harlequin's horse, the only fault of “which was that he was dead.” The same epitaph, I fear, would do for both reserves: “*Requiescit in pace et non in bello resurget.*” Now, bearing in mind that it was “trained soldiers” that were in demand in 1803, not recruits, not Militia, not Volunteers; that the question as put to Parliament even in 1806, and by a Whig Minister, was: “How are we to ensure to this country what unquestionably it has “never had, a never failing and adequate supply of regular soldiers?” I think we shall not be going beyond the mark, in 1876, in putting the requisite reserve of the regular army at nearer 300,000 than 30,000. And at the back of these should be the Militia and the Volunteers; not a militia which has the distinction of regulars without the training; not volunteers which, as was said of those of 1803, “were as much an army as a man's picture is himself;” but which shall both of them together form the old constitutional force, the armed people of England, prepared, as Pitt said of them, “to fight on their own soil for everything dear to the individual and “important to the State.” These men would form the garrison of England, while the regulars formed the moving army. No amount of ironclads could in these days give the same strength to the defenders, and hesitation to the enemy, as the knowledge that two such bodies could be called into existence at a few days' warning.

Preparation for Mobilisation.

That is one preparation required. Another which, like the former,

can only be properly done in time of peace, consists in the arrangements for concentrating all the forces when raised, at suitable places in the country selected beforehand, for collecting the necessary war stores and provisions at these places, for constructing field works in positions carefully planned before, for taking possession of certain railways and telegraphs and occupying certain lands, so that, on declaration of war, all these questions will not have to be discussed by Committees at the War Office, as in 1803; but that that declaration, *ipso facto*, will be the authority for Generals of districts, in concert with Lords-Lieutenant of counties, to proceed at once to carry out the plans lying all ready drawn up in detail in their offices. We know that a great deal has been already done, and is doing, towards this essential preparation, especially in the lately created Intelligence Department of the War Office, which has at once shown its value by commencing to perform that important service towards the defence of the country, hitherto almost unattended to, of collecting the necessary information to enable the war authorities of the country to decide upon the above questions; and the constitution of the different army corps, &c., published in the Army List for December, 1875, shows how carefully and fully that Department has considered this subject. But after these Officers have completed their valuable labours, if it is not to be all lost labour and waste paper, the Government will then have to do its part, in putting the whole arrangements on such a practical and permanent footing, that the two local authorities above mentioned—the civil and the military—will have both the legal power and the practical means of carrying them out, without further direction from either Parliament or Government; so that we shall not have, as happened in 1803, to discuss a Defence Act under the excitement of external war, as well as under the internal disputes of party politics, and parade, as they did, our family jars before the world at a time when the thoughts of the whole country should be turned solely towards its defence. And to satisfy the country of the efficacy of the arrangements, they should be put to practical proof by making the Autumn Manœuvres an opportunity of collecting forces by railway on different parts of the coast to meet an actual debarkation from our fleets.

Localisation of Authority.

And yet, notwithstanding Reserves, Defences, and Acts of Parliament, there will still be confusion and delay, unless a more real *localisation of authority* is established than exists at present. Lord Cardwell's Localisation Act came in with such a flourish of trumpets, that many people believed that it completely effected this object; they should be made aware, therefore, that it merely connected the regular regiments with the militia regiments, and left the powers of local General Officers almost as limited as ever, and even reduced that of Lords-Lieutenant of counties. Now, in 1588, the counties paid for their own troops and own defences, and hence each county had an interest and a pride

in making both efficient, and they showed by their acts that they had. Two centuries after, the system had so completely changed, that between 1793 and 1814, there must have been about twenty different individuals, who conducted the whole defences of the kingdom from London, each coming new to the work, each independent of the other, each with his own crotchets, which he insisted on having discussed by Parliament, as the one original and only effectual panacea for security. And if we have war in 1876, there will be two or three gentlemen in Pall Mall, who probably began to study military matters for the first time about twelve months ago, who, with the help of the electric telegraph, will equally decide on the movements of a General's army, the issue of an extra ration to Private Smith, the firing of an extra round of ammunition, and the purchase of a palisade; and these gentlemen may be changed at any moment for two or three others, who will have equally to decide these questions with probably equal knowledge of them. This is not a system suited to the English character; that is only brought out into full action by the responsibility of independent power within the range of each man's sphere of duty. This I believe to be the chief cause of the success of British seamen, and of the constant vitality of our Navy through all England's difficulties. The General of a district ought, like the Admiral of a Fleet, to feel himself responsible for every part of the military matters in his district; for the fortifications, the guns, the military stores, the provisions, and for the efficiency of all the arrangements we have been talking of, for the defence of the country. At present he is virtually only responsible for the discipline of the troops and the drill of the infantry and cavalry; and it has this doubly injurious effect, that the Generals cease to take a real interest in the defensive measures of the country, and it comes to be considered that ability in drilling troops of the line is the one essential qualification for a General. And there is the same want of unity of knowledge and power in the War Office in London. There is no Commander-in-Chief of the British forces really; he is only the Officer commanding the regular troops in the United Kingdom. We have little wars going on continually in every climate on the globe, and we don't know how soon we may have great wars going on in parts we are totally ignorant of; and yet we have only just established an Intelligence Department to collect the indispensable information for such wars; and we have now no one permanent person in a position to combine that information with a knowledge of all the war resources of the empire, in such a manner as to guide the temporary political War Minister in conducting the defence of it.

NAVAL PREPARATIONS IN ENGLAND.

Over-Confidence in our Security.

I am not competent to enter into any detailed discussion of the lessons to be drawn from the naval preparations in England to oppose the projected invasion of 1803. I can only state, and that briefly, the

general character of them, and such points in them as strike me to be prominent; leaving it to naval men to extract what moral they can for the next time.

The general impression made upon me by the records of the naval part of the defence is, the confidence in the successful result of it that was felt both on sea and land; and yet the Navy was in just the same condition of unreadiness as the Army when the war broke out. Twice in his career had Mr. Pitt to re-construct the British Navy—once in 1793, and again in 1804. In 1792 there were only 15 line-of-battle ships in commission and 15,000 seamen; in 1794 there were 80 liners in commission and 70,000 seamen.¹ Here seems an argument for providing a large reserve for the Navy, of seamen, ships, and stores; what expense, what labour, what unjust misery must have been occasioned by having to purchase, build, and impress to that extent in a year. The unsatisfactory character of the impress was shown by Pitt's attempt, in 1794, to raise a reserve, by taking a tithe of men, out of the Merchant Service, in a systematic way, according to tonnage, by which, out of a total number of 100,000 merchant seamen, he expected to get 20,000; and another 10,000 by levying one man from every parish. But this rude and unjust method did not apparently succeed any better than the still ruder and more unjust impress. In 1802, the number of seamen was allowed to get down to 30,000, and in 1804 it had to be raised again to 80,000.² And of the vessels purchased at this time for the Navy, to replace those sold in 1801, many were lost owing to their unfitness for the purpose. James says that, in 1804, there were 87 war vessels launched;³ the Government, in 1802, had evidently been "preparing for peace," according to Mr. Forster's interpretation.⁴

Notwithstanding this makeshift fleet, there seemed to be no doubt in anybody's mind that "the narrow seas" were quite securely guarded. The tone of the Navy is that of men accustomed to victory, and whether the squadrons were large or small, badly found or not, there was no hesitation about keeping up the blockade of the enemy's naval forces. This difference of feeling, as compared with the land forces, was not due to any difference in the men themselves, for as soon as England got a really efficient army on to the Continent, under a really efficient commander like Wellington, we find exactly the same atmosphere of victory, and feel the same confidence in ultimate success in all difficulties. In each case the men were confident in their own strength, only in the Navy that had grown up as a part of their necessarily self-dependent and responsible existence; whereas, in the Army, that state of existence is a war plant not grown in peace time.

There is, however, I think, a note of warning to us, in that very confidence of the people of England in the secure guarding of the narrow seas; for it was that underlying feeling which caused them to neglect their defences on land. There was evidently at the bottom

¹ "Ann. Reg.," 1795.

² "Ann. Reg."

³ James, "Nav. Hist."

⁴ Mr. W. E. Forster's address at Edinburgh, Nov., 1875.

the unspoken idea that all the preparations on land were very well as an evidence of the spirit of the people; but that the enemy would never really come, the Fleet would take care of that. We shall see in the next part how very, very nearly the enemy were in coming in spite of the Fleet.

Naval Forces in 1805.

In 1805, according to James's list, there were altogether in the British Navy about 800 vessels having a total tonnage of 660,000 tons, including 80 building;¹ this list does not appear to include the special flotilla got up for opposing the French flotilla; for, in 1804, the Secretary of the Navy, in the House of Commons, stated that there were about 600 vessels in the flotilla, in addition to 880 in the main part of the Navy.² Of this fleet, 180 were ships of the line, but only 83 of these were commissioned as sea-going. In Steel's Navy List for April, 1805, the following is the distribution of the ships of the line; this month's list fairly represents the general disposition of the fleet for opposing the scheme of invasion, and before the opening of the ocean drama of 1805 by Napoleon disturbed the previous general arrangements.

Distribution of British Liners.—From Steel's Navy List, April, 1805.

1. In the English and Irish Channels (Rear-Admiral Lord Cornwallis)	..	..	22
2. In the Downs and North Sea (Admiral Lord Keith)	..	..	6
3. In the West Indies and America.. (Rear-Admiral Lord Cochrane)	..	..	8
4. Coast of Spain and Portugal (Vice-Admiral Collingwood)	..	..	14
5. Mediterranean (Vice-Admiral Lord Nelson)	..	..	12
6. In the East Indies (Rear-Admiral Sir E. Pellew)	..	..	8
7. In port, fitting	..	..	18
8. Guard ships, Hospital and Prison ships	..	..	16
Total in commission	..	..	104
9. In ordinary, &c., and building	..	..	78
Total	..	..	182

The distribution of the regular war-ships for the special defence of the narrow seas against the French flotilla, is thus given in the Commander-in-Chief's records, by the First Lord of the Admiralty at the time. These were all under the command of Admiral Lord Keith.

¹ See end of paper for detail of the fleet, from James.

² "Ann. Reg."

June, 1803.

On the French Coast—

From Ushant to Boulogne. . . .	20	Frigates and others.
From Boulogne to Dunkirk . . .	7	
On the coast of Holland	9,	including 1 liner.

On the English Coast—

From the Start to the Downs . .	12,	including 2 liners.
About the Thames	11,	including 2 liners.
Thames to Yarmouth	10	frigates and others.
The Naze and the Humber	3	frigates and others.
Fitting in port	6	

Total 78

In addition to these, there were in the Thames, 10 frigates across the river, a little below Gravesend, manned by the Trinity House; and at the Nore, about 6 gun-boats and at least 40 gun-barges; and 4 floating batteries were proposed for the Thames and Medway. In this account no mention is made of any special flotilla, which, by other letters, appears to have been under the orders of Sir Sidney Smith, for attacking the French flotilla in its course of concentrating at Boulogne.

Seamen.—Marines.—Sea Fencibles.

The personal naval force in 1805 consisted of 90,000 seamen, 30,000 marines,¹ and about 26,000 sea fencibles along the coasts of England and Ireland. It is noteworthy here that, as the naval force increased, so it was found advantageous, and even necessary, to increase the marines; for it is probable that as our more extended empire causes a much greater demand for over-sea expeditions than in those days, this necessary body, from its very amphibious nature, will become a far more important element in such expeditions. It was once, I think, proposed to increase this force largely, expressly with that view. I have included the sea fencibles among the naval forces, as well as in the land forces, because, although they were ordinarily stationed on shore, under the Generals of districts, they had boats (1,846, in 1805, in Ireland alone), for assisting in attacking any enemy who appeared on the coast, and when so afloat they were under the Admiral's orders. This fencible body is worthy of notice. They were originally recruited (voluntarily) out of the whole seafaring population along the coast, but when it was found that it was used as a means of escape from the Navy impress, it was modified to include only those not liable to serve elsewhere, either by land or sea. But, with a proper system of reserve for the Royal Navy, there would be no need for such restrictions; they would be the sea Militia of the country, and would be drawn from the whole seafaring population, excluding only the Naval Reserve, just as the ordinary Militia are drawn from the rest of the population. Their organisation is quite a model for any Militia force. The south and east coast of England, from Cornwall to Yorkshire, was divided into eleven districts, each under a Post

¹ "Ann. Reg."

Captain ; in Ireland there were twenty-one districts ; they had alarm posts along the coast, where they kept their arms (only pikes), and assembled once a week for gun-drill, in such parties and on such days as might be most convenient to the men (which, be it remarked, might be on a Sunday), otherwise they carried on their private business, unless specially called out. Two permanent men were stationed to each boat, with 2s. a day pay ; the other men had 1s. a day when on duty, and naval pay and allowances when away from their own district. The cost of them, including all expenses, appears to have been about £5 per head per annum.¹

Dispersion of the Naval Strength.

Thus the naval forces of the country were chiefly employed in watching the enemy's coasts. This does not appear to have been considered, even then, as an altogether satisfactory system of naval warfare. It was true it gave a feeling of security to England, but it was at a great expenditure of men and ships, which kept the sea perpetually at all seasons, while the enemy's fleet was safe and well in harbour ; and it scattered the naval strength over a great extent of ocean, in small squadrons, each employed in blockading an enemy's port or his colonies, thus giving him the chance, if he could escape out of one or two ports, of concentrating a sufficient force to defeat these small squadrons in detail. This was a plan of operation which suited the ideas of Napoleon, and this dispersion of the British naval forces suggested to him that tremendous scheme of naval strategy by which, in 1805, he so very nearly accomplished his purpose. Moreover, this system of "unenterprising defence," as Burke called the similar one in 1797, was not at all suited to the adventurous character of the British seamen. If the land defences and land forces of England and of her colonies had been better organized, a body of the fleet would have been available sufficient to have carried the British flag in triumph through the colonies of the enemy and her allies.

Still less does this system appear advantageous now, when an enemy has greater facilities of breaking through a blockade, and much greater certainty of concentrating his squadrons. And to give even the same feeling of security to the coast would now require such a naval force as would use up, in a wasteful manner, the maritime strength of the country. There is one element of naval warfare that never changes, and that is the distance of the horizon. With increased speed and certainty of movement, the enemy has only got the same zone of observation to pass over. Napoleon calculated on advancing over that zone at three miles an hour ; he could now do it at ten. Napoleon had to construct vessels expressly for the transport, and collect them by degrees together, to make sure that they would cross simultaneously ; he would now find, in the ports of the countries he then controlled, sufficient merchant steamers to carry over the same force he proposed, and which, leaving each their own separate ports, might deceive the British Fleet (as he deceived it in 1805), and meet at a given place at a given time, within a few hours of each other.

¹ Principally from Admiralty records.

And even in 1805 this feeling of security was not felt by the Admiral himself who had charge of the naval defence. Lord Keith, in a very remarkable private letter to the Duke of York, in October, 1804, shows that he at least divined that Napoleon would never attempt to cross with the flotilla alone, but that he would endeavour to get part of his blockaded squadrons out, so as to assemble a sufficient force in the channel to cover the passage of the flotilla. And he goes on to point out that is was quite possible for the French squadron in Brest (twenty-one sail of the line) to escape in easterly weather, when the British blockading squadron would be driven off; and so to get as much as eight days' start of it. He then considered it practicable for the flotilla to cross over a sufficient force to secure a position inland in Kent, and for reinforcements to be brought over in sufficient strength to get altogether 300,000 men in England; and that the covering fleet would still have time to escape to the North Sea, before the British Fleet from Brest made its appearance.

In the face of these warnings, rendered doubly telling now by the increased advantages to the invader, I think it would be safer to make the real defence of England begin on the coast of England, and continue, step by step, every foot of the way, between that coast and London; and thus to allow the main body of the British Fleet to take its proper part in war of attacking the enemy, leaving the sea defence of the coast line to special gun-boats manned by a sea Militia.

Our Present Naval Forces.

But there are those who think the naval strength of Great Britain ought to be equal to playing both parts. I think if they would consider the amount of war-ships of different kinds that will be required for our various war purposes during the next great contest, they would be surprised at it. We have now in the Royal Navy, according to the Navy List for July, 1875, about 400 vessels of all kinds; this includes 26 building, but does not include 134 employed in permanent harbour duty, and not in commission or ever likely to be. The total tonnage by weight of these 400 vessels is about 900,000 tons; but to compare this with the tonnage of 1805, which was no doubt by old measurement, that number must be reduced to about 600,000, which is nearly equal to the total tonnage of the Royal Navy in 1805, as given by James. But our population has doubled since then, and the people are certainly not poorer; hence we may assume that, to defend the same interests, the Royal Navy in time of war will have to be doubled, and that it will not even then press so heavily on the people as in 1805. But the interests are not by any means the same; our exports and imports, which may be taken as a comparative measure of our floating commerce, have increased tenfold since 1805, and the tonnage of our merchant shipping has increased nearly fourfold. We are dependent on foreign countries for half our annual supply of the necessities of life, and we have interests and responsibilities scattered over the globe in dependencies and colonies, far beyond those which, in 1805, caused so much anxiety. Our interests, therefore, have

increased in a greater ratio than our population, and our war Navy must be in a greater proportion also.

But it will be said: the standard of our Fleet, like that of our Army, must be determined by that of the Fleets that are likely to be opposed to us. We have some measure of comparison on that scale also. About 1805, Napoleon calculated on being able to raise, out of the Navies of Europe, 180 line-of-battle ships to oppose England (he had 80 at his disposal in 1805); the greatest number of British line-of-battle ships in commission for sea service during the war was a little over 100, the greatest number for all purposes was 240. At the present time, the total tonnage of the British iron-clad fleet is about 350,000 tons, and that of all the rest of the world is about 770,000 tons.¹ If, therefore, we may compare iron-clads with line-of-battle ships, our Navy now bears rather less proportion to the Navies of the world than it did then. But these are only the peace establishments that are now existing; in war we must expect that foreign powers will increase their Navies, not only up to the increased extent of their own interests in population and commerce, but (in case of war with England) up to the value of the British interests assailable; and we must recollect that to attack sea commerce and most colonies does not require costly iron-clads of slow growth, but vessels of a class that most nations can now manufacture quickly for themselves.

On the whole, therefore, it appears probable that there will be plenty of occupation for the whole of the present British Fleet, and a good deal more to boot, on the outbreak of serious war, without including in that duty the guarding of the coasts of the United Kingdom.

THE DRAMA OF 1805.

First Act.

The year 1805 was one of the most eventful in the history of England. The story of it, with its surprising incidents, the great forces brought into play, the great issue at stake, reads like a grand epic drama, played upon the ocean for a stage, France and England for the actors, and all Europe for an audience. For once more in her history, as in 1588, England was standing up alone to hold mortal duel with the possessor of half Europe; once more England, the nominal champion of aristocracy, was in reality upholding the cause of true liberty; and once more her opponent, like Philip II, the self-styled liberator of the world, was the true representative of absolute despotism.

The drama may be said to open with the coronation of Napoleon, at the end of 1804. Amid the thundering applause of obsequious Europe, and with the sanction of the ancient ecclesiastical authority of the Roman Empire, the young conqueror at length ascended the last step of the ladder which was to put him nearly on an equality with the Cæsars. It is not surprising that he was thought to be the arbiter of nations—a conqueror, a statesman, a savant, and a genius,

¹ Dislere's "*Marine Cuirassée*."

and, withal, young and noble looking; he was as successful, as astute, and as indefatigable as Cæsar, as large-minded as Charlemagne, and as interesting as Alexander. No wonder that wherever he went, the people believed him when he said he was the giver of enlightenment and order; and that from the Baltic to the Adriatic they were ready to learn that lesson at his feet. His coronation procession may be said to have extended politically, as it almost did in reality, from Holland, throughout France, and across the Alps into Italy.

But throughout the whole of the magnificent spectacles that succeeded each other in these months, his mind was deeply occupied with the coming struggle between himself and the one European power which had shown itself determined to resist him. Hitherto, as M. Thiers points out, the two combatants had been resting as it were looking at each other, each holding the dominion on his own element, but neither willing to enter on the other and strike the first blow. And this careful calculator of chances had no desire to precipitate the contest, until he had extracted out of his subject kingdoms a naval force sufficient to make the operation almost a certainty. His early intentions were to have had 100 line-of-battle ships before he made the first stroke, even if he waited ten years for it: and all that great show of preparations at Boulogne in 1803 was partly to occupy the minds of the French people, and partly to keep England in a state of alarmed passive defence. The threatening attitude of Russia and Austria in 1804, brought about mainly by the ability of Pitt, forced him to act before he otherwise intended; and at the end of that year the hostilities commenced by England against Spanish vessels gave Napoleon an opening for completing a close alliance with that country, by which he obtained control over their fleet. This power of utilising towards his great scheme the maritime resources of all the States subject to his influence, was always made by him a *sine quâ non* in his treaties, and showed the bent of his real desires. Early in 1805 he had therefore at his disposal towards the great project about 80 ships of the line and 180,000 men; he trusted that his genius and his prestige would compensate for the deficiency of the former. Here we, judging after the event, can see a defect in this mighty mind, in basing his calculations for sea operations on quantity without regard to quality; he could not appreciate the full effect of individual character in ocean warfare. It may be doubted whether he did, or whether any continental nation at the present time do, fully appreciate its effect in land warfare. On the Continent, where all armies are alike drawn by conscription from all ranks and all conditions, numbers alone may decide the day; but in England we can afford to put a higher value on each individual who voluntarily takes up soldiering as a profession. Colonel G. T. Chesney struck a true national chord when he advocated an army organisation based on this principle at this Institution in 1874. In ocean warfare it is true that steam has now done much towards putting seamen of all nations on an equality—so much the worse for us—nevertheless, it is still to a great extent true that the real seafaring race cannot be created artificially, they must grow by nature to be true sons of Neptune.

Now, here is the plot of the drama we are reviving, in the words of the great author himself, written immediately after its failure confidentially to his Minister of Marine, in September, 1805.

“CHAPITRE I.

“*Quel a été mon but dans la Création de la Flotille de Boulogne.*

“Je voulais réunir quarante ou cinquante vaisseaux de guerre (ships of the line) dans le port de Martinique, par les opérations combinées de Toulon, de Cadix, du Ferrol, et de Brest; les faire revenir tout d'un coup sur Boulogne; me trouver pendant quinze jours maître de la mer; avoir cent cinquante mille hommes, et dix mille chevaux campés sur cette côte; trois ou quatre mille bâtimens de flotille, et aussitôt le signal de l'arrivée de mon escadre, débarquer en Angleterre, m'emparer de Londres et de la Tamise. Ce projet a manqué de réussir. Si l'Amiral Villeneuve, au lieu d'entrer au Ferrol, se fût contenté de rallier l'escadre espagnole, et eût fait voile sur Brest pour s'y réunir avec l'Amiral Gantheaume, mon armée débarquait, et c'en était fait de l'Angleterre.

“Pour faire réussir ce projet, il fallait réunir cent cinquante mille hommes à Boulogne, y avoir quatre mille bâtimens de flotille, un immense matériel, embarquer tout cela, et pourtant empêcher l'ennemi de se douter de mon projet: cela paraissait impossible. Si j'y ai réussi, c'est en faisant l'inverse de ce qu'il semblait qu'il fallait faire. Si cinquante vaisseaux de ligne devaient venir protéger le passage de l'armée en Angleterre, il n'y avait besoin d'avoir à Boulogne que de bâtimens de transport; et ce luxe de prames, de chaloupes canonnières, de bateaux plats, de péniches, &c., tous bâtimens armés, était parfaitement inutile. Si j'eusse ainsi réuni quatre mille bâtimens de transport, nul doute que l'ennemi n'eût vu que j'attendais la présence de mon escadre pour tenter le passage: mais en construisant des prames et des bateaux canonnières, en armant tous ces bâtimens, c'étaient des canons opposés à des canons; des bâtimens de guerre opposés à des bâtimens de guerre, et l'ennemi a été dupe. Il a cru que je me proposais de passer de vive force par la seule force militaire de la flotille. L'idée de mon véritable projet ne lui est point venue; et lorsque les mouvemens de mes escadres ayant manqué, il s'est aperçu du danger qu'il avait couru, l'effroi a été dans les conseils de Londres, et tous les gens sensés ont avoué que jamais l'Angleterre n'avait été si près de sa perte.”¹

I have given Napoleon's own words, because they show the true state of the case, on both sides, in a few lines, better than any other account I have read, and because it is a game that might be played again, and with advantages in favour of the assailant.

It was not carried out precisely as Napoleon describes it, but the idea was sufficiently adhered to as to confirm him, by its success, in the sagacity of his design. What a wonderfully daring scheme of

¹ Dumas, xii, 315.

naval strategy it was for those days of sailing vessels, requiring four months of sea voyaging in face of an enemy who had the "dominion "of the sea" at the time. The alarming point about it to us now is, that under such almost impossible circumstances, it virtually succeeded; the British Government was fully deceived, and the French naval force was eventually massed in the Bay of Biscay, in superior strength to the British force there at the time.

Future naval wars will probably be full of such strategic combinations. With proper pre-arrangements, steam navies can be assembled from different ports, one or two months' voyage distant, at an appointed place on an appointed day. Part of Napoleon's scheme, which he does not allude to in the above memorandum, gives us an idea as to the advantages steam now affords towards an invasion of England. He had to give considerable latitude to his naval commander-in-chief, Villeneuve, and in his final instructions he offered him two or three alternatives, in case of his being unable to carry out the main proposal. One of these was, to raise the blockade of Brest, and land the military force there on the north coast of Ireland, and immediately proceed north of Scotland, raise the blockade of Texel, and then go on to Boulogne.¹ One may presume, from the indications on the map of the channel I have before mentioned, that part of the Brest expedition would have landed in the Bristol Channel, and part of the Texel expedition on the east coast. And if the naval works at Antwerp had been completed as he proposed, that would probably have been the point of departure of a more powerful expedition to the east coast of England.

He would not require to construct an Antwerp now, nor to build transports; there are some half-a-dozen ports in the north of Europe which would now supply merchant steamers large enough for his whole Army, and powerful enough to assemble from each port at a given distant rendezvous, and then move together to any point on the east coast or west coast of England. Neither would he have to locate the troops for the expedition at the ports of departure; if the military stores and provisions are embarked beforehand, the men, and even the horses, could be brought by railway from the interior at the time for the departure. A scheme of ocean strategy which, in 1805, required two years' preparation by Napoleon, could now be arranged in two months, with less difficulty than one on land. What advantages have we gained since 1805 to counterbalance these of the enemy? None on the sea. We cannot expect to have more energetic commanders, nor, in all probability, shall we be so powerful at sea again; and we certainly are not likely to have a more wide-awake Ministry. But we can do this, which will counterbalance all the enemy has gained,—we can make his landing on the coast, and his advance from it, as dangerous an undertaking as the passage over the sea was formerly.

It was quite true, as Napoleon says, Great Britain was congratulating herself that her enemy's naval forces were securely shut up, and apparently *hors de combat*, and was fixing her whole attention on

¹ Dumas, xi, 214.

guarding her shores from the immense force and flotilla that had been gradually assembling immediately opposite to them. The shouts of that force, on the appearance of their Emperor as if for instant action, seen and almost heard from the English shores, may be said to close the first act of the drama of 1805.

The Second Act.

The second act opens with the escape of two French squadrons from their blockaded ports, one from Rochfort of 6 liners under Admiral Missiessy in January, and one from Toulon of 11 liners under Admiral Villeneuve in March. The action of the plot now begins.

Great consternation of English government busily employed watching Boulogne, at this unexpected flight of 17 French liners into mid ocean, to reappear nobody knew where. Perhaps at Alexandria, perhaps in the West Indies, perhaps in the East Indies, perhaps in Ireland; certainly not in the Channel: nobody in England apparently (except Lord Keith) thought of that possibility.

The Rochefort squadron was first heard of in the West Indies; Admiral Lord Cochrane with 6 liners was immediately sent in pursuit; but the whereabouts of the Toulon squadron was a most alarming puzzle to the British Government. The natural supposition was that it had gone to unite with the other squadron; but with an enemy like Napoleon anything was possible. Egypt and India beyond it were known to be still looked at with longing eye. Napoleon took care to foster the alarm he had calculated on; he massed an army at Tarentum in South Italy, and got Spanish vessels moved, as if for a fresh Egyptian expedition: he published false news of operations by the French in the East Indies and the Cape; and part of Villeneuve's work was to threaten the British colonies in the West Indies, and even to take St. Helena. So that, as he expressed it himself, Great Britain would find herself attacked at once in Asia, Africa, and America: and would thus be compelled to send her fleets from the shores of England to the rescue.¹

It is fearful to think what would have been the British anxieties, had the Suez Canal been then in existence. The whole land forces of the country would hardly have been enough to stop the man, who had already conquered Egypt with 25,000 men, from appearing some day at Bombay.

Then to add to the general alarm Nelson with his 10 liners, who had been watching Toulon for two years, disappeared also: this was perhaps a greater cause of anxiety to Napoleon than to the British Government; it was bad enough to know that Nelson was off any port, but not to know where he was at all, moved even the indomitable Emperor. The Admiralty would doubtless in their distraction have done exactly what Napoleon wished them to do, dispatch another Fleet after Villeneuve, if they had not been relieved from their distress, by news from Nelson himself; that after a month's fruitless search through the Mediterranean, he had ascertained that Villeneuve had picked up

¹ Dumas, xi, 209.

6 Spanish and 1 French liner at Cadiz, and gone westward ; and that he was about to follow them. So did our great seaman earn the Laureate's crown of praise :—

“O shaker of the Baltic and the Nile,
O saviour of the silver coasted isle.”

In all his calculations, which were daily written throughout his coronation tour, Napoleon slighted the notion that even Nelson, with ten ships worn out with two years' cruising, would follow across the Atlantic eighteen fresh ones. His daily correspondence with his Minister of Marine at this time, published by Dumas, his close calculations of all contingencies, every mile of the way to the West Indies and back, every day Villeneuve would require, and the close agreement of them with the result, give one an insight into the foundation of his power. He had victuals prepared for Villeneuve at several of the ports where he might touch on his return ; and to the expostulations of his Minister, he returned an answer, which the British War Department might take to heart : “This is not a time for “ridiculous economy—in such a war it is only ignorance, not to have “plenty of provisions, which keep so well.”

The scene now changes to the West Indies. Nelson perceived very soon after his arrival there, by the action of the French fleet, that their return to Europe was imminent ; and for the first time the real origin of all these sea movements occurred to him. Now in this part of the drama, it must be allowed that the French have some reason to complain, as they have done, of the unhandsome treatment of their cause by fortune. Villeneuve was 35 days from Spain to the West Indies, Nelson was only 25 days ; on the return voyage, Villeneuve was 54 days from the West Indies to Spain, Nelson was only 36.¹ But the unkindest cut was the vessel that Nelson sent home to warn the Admiralty of his discovery of the plot ; it had apparently been captured from the French, and was, like many of their vessels, a model sailer, and therefore selected for this great international race across the Atlantic. The “*Curieux*” started 16 days after Villeneuve, and got to Europe 15 days before him :² it was certainly hard that their own science of ship building should be made the means of their defeat. Mars and Minerva had led their favourite Napoleon triumphantly over the terra firma of Europe, and now sat on the prows of the French flagship ; Neptune sulking at the general incapacity of the British Government to rule the surface of his domain, was appeased by the noble sacrifice of his dear son Nelson, and held on to the stern of the Spanish liners while he shoved the “*Curieux*” a head.

The last scene of this act lies in London. The First Lord of the Admiralty is discovered fast asleep in bed on the morning of the 9th July, 1805, worn out no doubt with watching Boulogne and wondering what had become of Villeneuve. He opened his dispatches in bed with regret at having to begin his official day so early ; and finds one

¹ The times of the French fleet are taken from Dumas ; and of the English fleet from James.

² James.

from Nelson, which had been lying by his side all night, informing him that by the time he was reading that letter, Villeneuve would probably be entering the Channel with a force sufficient to sweep Cornwallis and Keith before him, and ferry Napoleon over to Dover. What an awakening to the real light of the case, for the hitherto benighted First Lord devoting day and night to watching Boulogne! With the danger, however, came the pluck to meet it; he then and there, unwashed, unbreakfasted, unshaved, sent off the orders to Cornwallis to intercept Villeneuve if possible; and, Neptune relenting at this reveillée, which Napoleon himself could hardly believe, Sir R. Calder was at Cape Finisterre, with 15 liners, by the 15th July.¹

The Third Act.

Then begins the third and most momentous act of this startling drama, at which Europe held its breath. On the 22nd July, the fog, emblem of the impenetrable secrecy that had hitherto enveloped Napoleon's schemes, lifted for a moment at Cape Finisterre, and showed to Calder the French and Spanish fleet, now 20 liners strong, before him: just seven days too late. After two years of careful maturing in the master mind, and four months of equally careful execution, so precisely calculated and so precisely carried out, that this final issue was within a few days of its prediction, it was lost by only seven days. Well might Napoleon say that his able arrangements and their marvellous accomplishment deserved success: and well might we too now say, that the absence of arrangement and haphazard execution by the British Government did not deserve that they should be saved by the bold devotion of one man.

They were not saved yet though. The climax of the plot was still to come. The engagement which of course came off between Villeneuve and Calder, was a drawn battle; Calder then went north to join Cornwallis again, thus leaving it open to Villeneuve to pursue the route which Calder had been sent expressly to intercept. To take in the proper idea of the extreme peril England was in during the fortnight after that battle, we must recollect the position of the respective forces at the time. *On the English side*, the main body of the Fleet, 18 liners, was with Cornwallis off Brest,² with 4 or 5 in addition off the coast of Ireland, Calder with now only 12 liners in the Bay of Biscay, Keith with 6 in the North Sea fully occupied in watching the enemy's coast and guarding his own: Collingwood off Cadiz with 4, Nelson at Gibraltar with his 11 pretty nigh exhausted with their late expedition. *On the French side*, Villeneuve had still 18 liners; there were 5 French and 10 Spanish in Ferrol, and 5 under Admiral Lallemand, cruising off the Bay of Biscay on the look out for Villeneuve, and 21 shut up in Brest under Gantheaume: and at least 10 liners at Cadiz. Nelson and Collingwood knew nothing of what was going on at Cape Finisterre, and the former after revictualling in Gibraltar made his way into the channel, and joined Lord Cornwallis on the 15th of August, from

¹ James.

² James, iii, 184.

whom he first learned the result of his forethought in sending home the "Curieux."¹ Thus between the 22nd July and the 15th August, during 24 days, Villeneuve had the opportunity of assembling 38 ships of the line off Brest, which with the 21 in that harbour, would certainly have compelled Lord Cornwallis even if he had been joined by the 5 in the Irish Sea and by Calder's 12, to have retreated before them, and have given the command in the Channel to the French for at least 14 days.

One can well imagine the exultation of Napoleon, who was already at Boulogne, on hearing of the arrival of Villeneuve at the appointed rendezvous, and at the appointed time. There is, perhaps, no other instance in history, where a scheme of war strategy, involving so many combinations, subject to so many chances of failure, and extending over such an area, was so completely carried out. The victorious Emperor stood on the heights of Boulogne, with all that enthusiastic host of soldiers fully prepared in every way to leave the French coast within twelve hours after the appearance of the combined fleet, and as certain as ever an army was of at last striking that overwhelming blow at England for which all Europe had been waiting for two years. In his feeling of securely grasping success about this time, he wrote, after discussing various possible moves of the English Admiralty: "I do not know, indeed, what precaution England can now take to shelter herself from the terrible chance she is running. That nation is little wise, when, without fortifications, without an army, she allows herself to get into the condition of seeing 100,000 men land on her shores,"² One can also well conceive what must have been, or at least what ought to have been, the fear and remorse of the British Government, at having so completely failed in providing any sort of strategic combinations on their own element equal to the occasion. Sir R. Calder was made the scapegoat of the national panic, for which the Government and Parliament were the real defaulters; and, as if appeased by this poor victim, the angry sea-god once more saved his neglectful daughter Britannia by the glory of his dear child Nelson.

Villeneuve did make an attempt to carry out his mission, the completion of which Napoleon pressed upon him by daily messages; but it was not till the 12th of August that he left Ferrol with 29 liners, French and Spanish; and before he had gone far northward he heard that 25 English liners were before him;³ and believing that his unceasing pursuer, the terrible Nelson, was with them, he did not feel his fleet equal to that encounter, and so turned south, and, taking advantage of part of Napoleon's instructions, he made for Cadiz. It was true that Calder, reinforced to 20 liners, was in his neighbourhood, and that part of Nelson's squadron was with him; but as Napoleon told him afterwards, Nelson's ships without himself were no more than any other ships. Towards the end of August, the news arrived in London and Boulogne that Villeneuve was in Cadiz, and it was felt on all sides at once that the game was over for that season. The turning of Villeneuve southward about that 14th August, 1805,

¹ James.² Dumas, xi, 171.³ James iii, 255.

was like that day in August, 1588, when the Duke of Medina turned his head toward the North Sea after the battle of the Godwins; it was the day of salvation to England from a crisis such as occurs seldom in a nation's history, and it was virtually brought about by the same cause in both cases. The combined Franco-Spanish fleet was not in a condition to try another battle with the English fleet; there is no stigma of want of courage in either the French or Spanish Admirals; it was a fleet of two nations, and the Spanish ships were not in good condition. Thus, Napoleon's long-drawn plot was eventually defeated, as the Spanish Armada was defeated—not by the patriotic unity of the British Parliament, nor by the forethought of its Government, but by the character of the British fleet.

The Fourth Act.

If, in the beginning of September, 1805, we suppose the curtain to rise upon the scene of our drama for the fourth act, the vast legions assembled on the opposite shores of France for England's destruction would be found to have disappeared; of all those 150,000 experienced soldiers, collected so gradually and with such forethought, not 20,000 remaining; and that unexampled flotilla, so completely organised, in rapid progress of being dismantled, and stored away. It required but a few hours' thought of that extraordinary mind to turn the whole current of war from west to east. So clear and prescient was his brain, that on the same day of his receiving the news of Villeneuve's retreat, he dictated the plan of the campaign that conquered Austria: before Britain had realised her escape, the great "Army of England," as it was called, had begun to move towards the Rhine. Within a month of his watching on the heights of Boulogne for the signal to invade England, he was at Strasburg, watching the concentration of all his forces from Hanover, Holland, Switzerland, Italy, and Boulogne, upon Bavaria; and before Britain had recovered her supreme relief at Trafalgar, he had subdued Austria at Austerlitz.¹

Villeneuve's retreat had not removed all fear of invasion in England; though the fleet was shut up in Cadiz, it still existed, and more powerful than ever, for the Spanish liners it found at Cadiz brought it up to the strength of 43 ships of the line; a very powerful engine of war, and which, in Napoleon's hands, might still some day repeat the enterprise from which only good fortune and good fleet had delivered them. And Napoleon fully intended that it should; and, moreover, he deliberately made arrangements for the express purpose of keeping alive in England that alarming possibility, and expressly in order that she should thereby be prevented from interfering with his schemes on the Continent. He kept a portion of his army still at Boulogne, and sufficient of the flotilla to carry 50,000 men; it was easy for him to assemble that force; and hence, if at any time during the chances of war he could obtain the command of the Channel again, he could in one tide transport that force into England. Thus, at a small expense to the French, Britain would be compelled to keep

¹ Dumas, xii.

up a large force of troops along the southern coast, and a portion of her fleet constantly in the Channel.¹

And those arrangements of his fully answered his purpose; for Great Britain had not yet awoke to the clear perception that it was only by interference on the Continent that Napoleon's power could be really made innocuous; and they would have gone on perhaps for years content with guarding their own shores, if Nelson, who had so often checked Napoleon whenever he put his foot upon the ocean, had not given him a final checkmate at Trafalgar.

The Fifth Act.

The great drama of 1805 closes with this complete settlement of the question of invasion. Nelson had been sent to watch Villeneuve, and the latter, in pursuance of Napoleon's plan, was moving into the Mediterranean to threaten Malta and Egypt; when Nelson, who felt that there could be no rest so long as the naval forces of the enemy were so powerful, at once attacked him, and on the 21st October, 1805, at Trafalgar, Great Britain was finally freed, by the destruction or capture of the majority of the combined Franco-Spanish fleet, from all real danger to her own sacred soil during the rest of Napoleon's career.

The last scene of the last act of this most eventful period may be said to be the death of the two Englishmen who had been the two heroes of the drama—the statesman Pitt, who by his powerful spirit had roused his country at home and the discontented States on the Continent to vigorous action against the despotic power of Napoleon; and the seaman Nelson, whose daring and devotion had compelled the conqueror of the land to feel himself powerless on the sea. It seemed as if, when the tide of war was thus turned from the west to the east, that the work of these two great Englishmen was done; together they had worked head and hand to bring about that result, together they sank, and together they live in Scott's lines:—

“ — The buried warlike and the wise,
The mind that thought for Britain's weal,
The hand that grasped the victor's steel.”
SCOTT (“Marmion”).

SUMMARY.

“If you wish for peace, prepare for peace,” said Mr. Forster at Edinburgh. So say we all: if you wish for peace,—*prepare*—that you may have peace. *Prepare* is the watch-word which should be written over our war departments, naval and military. And if we read the story of the war of the great French Revolution aright, especially that episode in 1805, and then consider the present condition of our war preparations, we shall, I think, all come to the conclusion, that to avoid the evils of those times, we had better begin as soon as possible to remedy the following deficiencies in that war apparatus:—

1st. *A Reserve of trained men, both for our Regular Army and Regular Navy*: of strengths equal at least to the respective present

¹ Dumas, xii, 315.

peace establishments of each: which shall consist of really efficient soldiers or sailors, and shall be really forthcoming at the time and to the full numbers required.

2nd. *Reorganisation of the Militia both for land and sea service:* to take them out of that half and half position into which they were forced during that war, and which failed over and over to produce the effect desired, and restore them to their proper constitutional position, of local bodies of the armed people of England: of which the volunteers would then become the elite. These two bodies together should be so organised that on declaration of war, in a few days, a sufficient force would be embodied and armed to line the shores of Great Britain.

3rd. *The Mobilisation scheme for the defence of the country* should be perfected and have given to it the necessary legal authority; so that the local commanders will be able to proceed in the assemblage of the forces, and the military stores, and the provisions, without further reference to London.

4th. *An expeditionary equipment*, including all the military stores required for 50,000 men, should be kept always ready in our arsenals. And arrangements should be made that certain vessels of the Royal Navy or merchant vessels shall be available for the transport of men and stores, so as to ensure that men and stores shall be disposed in the vessels in a manner suitable and effective for the purpose of the expedition.

5th. *Coal depôts in secure harbours* should be provided at the strategic points in the world, best suited for the support of our naval and military operations.

The Question of Cost.

But we must cut our coat according to our cloth, says the cautious public man. Well, it is a good cloth, there is no denying that, and deserves to be well made: and cut of a fashion that will do credit to the owner; for, as a good English authority tells us "the apparel oft proclaims the man." But however truly we apply that to ourselves privately, in our military dress we often think our "clothes more costly than our purse can buy." It is not by any means certain, however, that Prussia is not upon the whole paying more heavily for her military power than Great Britain is at this moment. Military organisation, like gymnastics, may be carried too far and weaken the body it was intended to strengthen: and may be drawing on the strength of a nation more than any mere money payment ever can do.

In 1793 they had the same cloth that we have now; they made it up cheaply, not expecting to have to use it; and when the war storm unexpectedly turned upon them, the cheap military coat let it in at the seams, and, as generally happens with cheap articles, John Bull had to get a new one sooner than he expected; and such a creature of habits of all kinds he is, that the second coat was made up as cheaply as the first and lasted no longer; and a third followed in the same course. About which time he began to see that the quantity of cloth he used

up cost more than the making in the most expensive style. By trying to do it cheaply at first on £7,000,000 a-year for all his war expenditure, instead of blowing the fire out, he blew it up; then he thought he could put it out with £12,000,000 a-year, but it was beyond that already; and at last at the end of twenty years he had got up to £55,000,000 a-year for purely war expenses; and not only was that generation burdened with this expenditure, but their posterity have had to go on paying and will have to go on paying £25,000,000 a-year for this cheap tailoring. And this was expressly said at the time to be "preparing for peace," and not preparing for war: if so, preparing for peace sounds to us very like shoving the expense on future generations.

It is not certain either whether these proper reorganisations of our war apparatus will be more expensive than the present one. At least as regards the Reserves, which is the most expensive part, there have been schemes proposed and estimates made, notably that by General Simmons,¹ which show an actual decrease of expenditure for an improved army. It is certain that our present system is an expensive way of preparing for war; for by it, during all the years of general peace, we keep up an army and navy of a costly description, and larger than we require for our peace garrisons by sea and land. And this is done, solely because we are afraid as a nation to look war straight in the face; we persist in keeping it out of sight and pretending to ignore its possible existence: and thus Governments, Parliaments, and people are driven to practice the self-deception by which nobody is deceived, of declaring every year our disbelief in permanent armies and in war, while all the time we are keeping up a permanent army and navy, extravagant for peace, because we know we dare not dispense with one man of it in our present state.

The Question of Safety.

But if we blame that generation for not seeing more clearly the full extent of the war storm that was coming upon them, when its aspect was mainly political; what should we say of them, if their means of existence had been plainly liable to be cut off at the first burst of war. If Napoleon thought England foolish for allowing herself to fall into the condition of imminent invasion, what would he have thought of her, if, in addition to that danger, she had only secured the means of feeding half her people: if England had allowed herself to be not only invested, as Burke expressed it, but on half rations? Such is, however, our case now. We are dependent every year upon foreign countries for nearly half our supply of bread and meat; of the foreign meat supply the chief quantity comes from Northern Europe; of the foreign bread supply the chief quantity comes from the United States. Thus, if the ports of one of the great Northern Powers were closed to us, the price of meat would quickly rise in England; and if it was those of the United States, bread would rise; and a coalition against us of those States with one of the northern Powers, would

¹ "The Military Forces of Great Britain." By General Sir L. Simmons, R.E. 1871.

compel us to fight for life; and in any case of war, we should start with this certain disadvantage, a discontented population upon reduced wages and increased cost of living.

The political economist would immediately say, then form alliances with the States which supply you with food, and you have the double security of preserving peace both by political alliance and commercial intercourse; but commercial intercourse has not succeeded in former times in ensuring peace between two nations. In 1588 there was great commercial intercourse between England and Spain, and yet that did not stop the Armada from coming. In 1807 there was great commercial intercourse between England and the whole of Europe, especially the Northern Ports, but that did not prevent Napoleon from closing the whole of the ports under his control against the commerce of England. And the instructive part in this latter instance is that the first country to complain of the stoppage of trade was England herself. She felt it more than the continental nations, because she was not only the producer but the carrier also. In the present day Great Britain has not only this war disadvantage as compared with other nations, but she has the additional one, with respect to northern countries, that the trade is not of equal importance on each side. Because the produce that those countries get from Great Britain are chiefly luxuries, whereas those she draws from them are chiefly necessities of life.

The theories of the political economist in this respect appear, therefore, to be of an artificial composition, which won't stand the heat of war. We have, however, means within our power of insuring to a great extent our supply of food at all times, in our great colonies of Canada, the Cape, Australia, and New Zealand, which are all essentially food-producing countries.

The question of the length of voyage is one mainly of price; and a case of war would be quite possible, in which the price of meat in England would well remunerate the importer from any of those colonies. But if those colonies are to be any advantage to the mother country in this respect in war time, the food trade with them must not be left to be produced by the exigencies of war, but must be fostered during peace by an alliance based on mutual interest.

With respect to the question of commerce generally, it is somewhat remarkable that the countries from which we draw these necessities of life are the northern countries of Europe and America, whereas the commerce with the southern countries of Europe, Asia, and America, is chiefly for what we may call the luxuries of life. It has also so happened, that the general coalitions in war have been between the northern countries against the southern. If, therefore, in case of a war with the northern States, we are in danger of losing our food-supply, the same measures of security which we shall have to take to preserve our commerce with southern Europe and with Asia, would also preserve our food supply from Australia and the Cape.

The Question of Honour.

There is another point of view from which the war aspect has

transport Fleet. We could no more avoid occupying certain points on the ocean in strength, than we could hesitate about moving regiments to their appointed places for the defence of our shores. Some provision has been made in the mobilisation scheme for the troops for such an expeditionary force, but the difficulty and the delay in sending out expeditions from home has not been in the selection and preparation of the troops, but in their equipment and transport. The equipment for war of a certain force of troops has been laid down on paper, but if it is not to be one more record of official good intentions, it requires to be put into a more practical form for actual use. It is not enough to have a mass of war stores stacked in bulk in great storehouses; there are certain of them, including cavalry and artillery equipments, and guns and ammunition, which any expeditionary force would require to have with them ready for action on landing; these should be kept at the places of embarkation, and arranged, not merely for the voyage, but so as to be immediately available for use at the end of it, so that each ship-load of troops will find themselves landed fully equipped, for a time, with stores and provisions. We have been too much in the habit of treating troops and stores as two species of goods, which are to be carried somewhere somehow, but when and in what order has been thought a secondary concern—to the shipper, at least. In the Crimean War, the shipment of guns and artillery stores from England, in this general cargo fashion, was one of the causes of the confusion and delay that occurred in that expedition. But if we are really to take full advantage of the ocean as a base of operations, these points must be considered, experimented on, and practised just as much as for land transport.

The subject of our sea transport has been ably discussed by Captain Hoseason, R.N., both in this Institution and out of it. He has shown, not only the inefficiency of this system of taking up tonnage on the spur of the moment, and shovelling troops and stores in as they happened to come, but the extreme extravagance of it. It is like a man buying up the corn of a province without having any means of taking it to market; he is at the mercy of the carriers. We have now six regular troop ships in the Royal Navy, and five belonging to the Indian Government; the total tonnage of these eleven vessels is about 33,000 tons (old measurement); they would, therefore, carry about 16,000 men, without guns or horses, on a long sea voyage. This is a poor provision for an empire on which the sun never sets and wars never cease; not enough to punish an African Chief with. An ocean empire, like Great Britain, in which some expedition is going on every year, and every one of them joint expeditions—naval and military—should have a regular organisation for the purpose, something like a "*unit of sea transport*," such as Napoleon had in his mind in 1805, only, of course, on a larger scale. This unit, whether of one vessel or more, would contain a complete section of an Army, of all branches, with a proportion of stores and provisions; and the vessels would be, not merely transports to convey them to a port and have done with them, but would be attached to that division of the army during the expedition; they should be felt to be their real base of

The path seems perilous only because we have not made up our minds to prepare for it; we are still striving to manage an empire after the fashion of a municipality. But if our descendants in the United States could found an empire capable of indefinite expansion, surely we could form a confederacy suited to our present position in the world. These islands are remarkably situated, politically and geographically, for holding the position we do at present. The continents of Europe and Asia form a great parallelogram, and all the continental states upon it, whether in Europe or Asia, have land frontiers to guard, and almost all their operations with each other, whether of peaceful commerce or war, have to be carried on by land. The British Islands, placed in a detached position on the north-west flank of this parallelogram, are more secure in themselves from attack, and yet by this position and by the character and habits of the people they have the means of operating round the whole circumference of the continental parallelogram, by sea, either for commerce or war. And this capability of utilizing the sea for these purposes will preserve an advantage to Great Britain over continental countries as long as the spirit of the British people remains the same, and as long as sea transport is so much easier than any kind of land transport, and is at the same time more harassing to the enemy.

From the political point of view, the geographical position of these islands has further advantages over other States. They are just opposite the line, on the continent of Europe, which divides the northern races from the southern; by descent, by language, by religion, and by productions, the States on each side of this line are more allied together than they are with those on the other side of it. And England, approximately to the main land just at this point, is in a position to watch, and, if necessary, to control almost the whole of the sea traffic that passes from North to South Europe.

Thus, by position, by resources, and by character, Great Britain appears to be marked out by Providence to be, at the present period, the peace officer of the world.

The Japanese are a race of islanders, similarly situated on the north-east flank of the continental parallelogram, and if their people had the same qualities as the British race, they ought to have played a similar part in the history of the Asiatic continent to that Great Britain has played in the history of the European continent.

A Marine Army.

But to utilize these advantages which Providence has given us, for the benefit of our commerce in peace and our security in war, the last two of the five principal improvements required in our war system should be taken in hand, and placed on a better footing.

An *expeditionary equipment* has an aggressive sound, but, in our present condition, it is really as much a part of our defensive system as the mobilisation scheme just published. For, in case of any serious war, our dependencies and military posts all over the world would require such additions immediately as would use up a considerable portion of our Regular Army at home, and more than all our present

transport Fleet. We could no more avoid occupying certain points on the ocean in strength, than we could hesitate about moving regiments to their appointed places for the defence of our shores. Some provision has been made in the mobilisation scheme for the troops for such an expeditionary force, but the difficulty and the delay in sending out expeditions from home has not been in the selection and preparation of the troops, but in their equipment and transport. The equipment for war of a certain force of troops has been laid down on paper, but if it is not to be one more record of official good intentions, it requires to be put into a more practical form for actual use. It is not enough to have a mass of war stores stacked in bulk in great storehouses; there are certain of them, including cavalry and artillery equipments, and guns and ammunition, which any expeditionary force would require to have with them ready for action on landing; these should be kept at the places of embarkation, and arranged, not merely for the voyage, but so as to be immediately available for use at the end of it, so that each ship-load of troops will find themselves landed fully equipped, for a time, with stores and provisions. We have been too much in the habit of treating troops and stores as two species of goods, which are to be carried somewhere somehow, but when and in what order has been thought a secondary concern—to the shipper, at least. In the Crimean War, the shipment of guns and artillery stores from England, in this general cargo fashion, was one of the causes of the confusion and delay that occurred in that expedition. But if we are really to take full advantage of the ocean as a base of operations, these points must be considered, experimented on, and practised just as much as for land transport.

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operations, their great depôt and means of supply: ships and troops should form one whole machine, fitted to each other for the whole work to be done. A British Army would then be able to fall back upon its movable base, and proceed with it to another line of operations, refreshed and in complete condition; while the enemy would be expending time, resources, and the strength of his troops in changing the seat of war by land: and one such "Marine Army" would be a match for two on land.

We have no proper place of embarkation for our expeditions at present. They are dispatched from one of the dockyards or from Woolwich Arsenal, as it happens to be convenient for the vessels. The wharf space in any of the dockyards available for this purpose is only large enough for one or two vessels, and even that would be required by the Navy in war time, and that at Woolwich Arsenal would be fully occupied, in any serious war, with the dispatch of the reserve stores; and it would not be desirable to enlarge the accommodation there, with the object of embarking troops also; for the reserve stores would be sent in different vessels altogether from those above alluded to, which would be only for the active force and for the equipment required for immediate use.

Its Strategic Points.¹

When Napoleon was organising his great scheme of combined naval and military strategy, one of the most important class of preparations that he had to make, was to plant depôts of provisions for the force at certain places on the route of operations. If the epoch of the affair had been seventy years later, he would have substituted coal for provisions. We can have little doubt, from his great care in providing those, that one of his first proceedings would have been to plant depôts of coal in numerous and secure places; he would have considered economy in such a matter as still more "ridiculous" and "ignorant" of war, than he did in provisions.

We have a good many harbours for the refitting and re-coaling of our naval forces, scattered over our ocean empire, but not enough for carrying out the defence of that empire on an efficient system of naval and military strategy; and in many of those existing, there are not sufficient means of protection, or for putting the coal on board expeditiously. Our chief lines of strategic operation will probably be those of our most important sea commerce, because they are also our lines of communication with our great productive colonies and dependencies. One of the greatest of these is the line of commerce to India and Australia; and, perhaps, at the present period, the two most important places in the world to Great Britain, outside of her own islands, are Suez and Singapore. We have lately obtained a legitimate footing of control towards preserving the freedom of the Suez Canal, both in peace and in war; and whatever the consequences of that step may be, commercially or politically, there can be no doubt that it will be of the highest value towards the naval and military

¹ In considering these subjects I have been indebted to an admirable pamphlet by Captain J. C. R. Colomb, R.M.A., entitled, "Three Smouldering Questions," 1875.

defence of the empire. Singapore must always be the centre of naval operations for the protection of our immense trade between Great Britain and India, on one hand, and China and Japan and the Pacific Islands, on the other, and also as the nearest point in the line of communication to Australia. It would be a serious danger to our connection with those countries, if the opposite coast of Sumatra should ever be occupied by a hostile force.

The extension of our trade to the north of China and to Japan, and the spread of Russian power on the north-east coast of Asia, and of the United States on the north-west coast of America, together render Hong Kong no longer so advantageous to us as a naval and military station as it was. Some position nearer to the Japanese Islands, which would also have a climate more favourable to our northern race, would now be desirable for a strategic harbour to protect our trade in those seas. Also some more connecting links between Singapore and Australia are now required, as that is a line of communication, like a road in a forest country, that offers many advantages to an attacking party.

It is impossible for us to escape from the necessity of securing such strategic positions on the ocean; if we do not make them deliberately in peace we shall have to do so hastily and expensively in war. In 1805, the fear of being attacked in the East Indies, and of losing one of our West Indian colonies or the Cape of Good Hope, was sufficient to give great anxiety to the British Government, and to take up the attention of a large portion of their forces, both naval and military. It was with them more a question of prestige than commerce; but with us now, the commerce with those same countries has become a question of necessity to provide occupation for our people; and secure harbours for coal depôts are far more necessary for the protection of that commerce than provision depôts were in 1805.

To the Unprofessional Reader.

At our public schools we leave the boys to settle their disputes among themselves, because we think a man should be trained to defend himself and defend others in life; he is not a man else.

That is what we soldiers and sailors want to persuade Great Britain to do in the world school, to be trained to defend herself and to defend others; Great Britain is not a nation else.

Well, and have we not always defended ourselves? says the English countryman. But you have never trained yourselves, and your backwardness has encouraged the enemies of peace to deeds that have forced you to rush in and lose a deal of blood in your clumsy ignorance; if you had shown yourselves prepared, you might have prevented it.

But, says the countryman, why am I to be prepared to defend others more than anybody else? Because you are the only nation in the world in a position to do it. You are safer from attack on your own land than any other nation; you have resources which draw wealth from all parts of the world to your shores; you have responsibilities all over the world. You are, by all these, made the peace officer of the world, and if you don't take up the duty, some other

nation will have to be appointed instead, and you are not at present prepared to do the work committed to you.

Surely, says the countryman, we are paying more for Army and Navy than anybody else; and look what an Army and Navy we have to what we used to have.

Look what armies and navies they are getting on the continent of Europe, compared to twenty years ago. When a pugnacious boy comes into a school, there will be a deal more fighting until he finds his level; so when a nation increases its armed strength, other nations must be prepared for war until it finds its level. Europe has gone back from peace to war; we may think it a great backsliding, a grievous waste of the resources of civilisation; but to sit down, and cry about it, is not quite manly. If your boy at school was to do so, you would tell him that he must take the fighting with the bread and jam, just as they come; he can't expect a school to be all bread and jam.

Well, says the countryman, we'll hold our own yet. I don't think, my friend, you quite know what that means at the present period of your history. It means a great deal more than sitting still to watch the coast of Great Britain. Europe is getting now into the condition described by Austria in 1804: "A situation which is not peace, but "more destructive than actual war; in which a single Power, already "too formidable by its greatness, continues alone armed, and is prevented by no opposition from occupying one independent State "after another." If Great Britain allows herself to be a party in such a situation, it will not be her own land only that will be threatened, but her colonies and India; and "holding our own" will then mean, that the Government of the day is in a better state of preparation than it was in 1803, when it was said of them, "they "were unable to remonstrate in such a manner as became the "Ministers of a great and powerful nation, or to interfere in such a "manner as to make their interference effective, or to mediate in such "a manner as to aid those in whose favour they mediated." If we are to "hold our own" better than that, if we are to prevent the lapse of Europe into despotism, whether autocratic or democratic, and if we are to preserve in our dependencies true liberty, political and religious, we must take the patriotic advice of Burns, which he gave to the defenders of 1805, only applying it to the whole Empire of Great Britain:—

" Be Britain still to Britain true,
Amang oursel's united:
 For never but by British hands
 Maun British wrangs be righted."

LIST OF BOOKS REFERRED TO IN THIS PAPER.

DUMAS: *Précis des Evénemens Militaires* (1822).—Is really not a *précis*, but a precise account, and with all the appearance of careful accuracy, and is distinguished above others for its copious extracts

¹ "Ann. Reg.," 1805.

² "Ann. Reg.," Parl. Deb., June, 1803.

from original documents. It also has this peculiar double advantage, that the author was present in high official capacity at most of the scenes he narrates; and yet, being under the Restoration when he wrote, his bias, though thoroughly French, of course, is not Napoleonic; and, for a Frenchman of that period, he is fair to England.

THIERS: *Histoire du Consulat et de l'Empire* (1845).—From his position as Minister to Louis Phillippe, M. Thiers had access to official papers beyond the reach of Dumas; but he has not used his advantages in the same conscientious way, and has not given us the same means of forming our own judgments by extracts. The tone of the work is not that of a calm historian writing forty years after the events, but of an advocate supporting a particular cause, which is that of French glorification, and therefore he is not so trustworthy as Dumas.

VICTOIRES ET CONQUÊTES DES FRANÇAIS (1817).—These records, though written by eye-witnesses, comprise so extensive a range of events for the size of the work, that the accounts of each are brief, and there are few, if any, extracts from original documents.

JAMES'S NAVAL HISTORY (1823).—This is the only book on the English side at all corresponding to Dumas; for, until the Peninsular War, there was little but naval operations to record, and this is more a register of the British Navy and its exploits than a history of the naval warfare of the period; but, as far as it goes, it has the advantage of being a conscientious compilation from original sources, with, of course, a certain prejudice as to the invincibility of the British Navy on all occasions.

ALISON'S History of Europe during the French Revolution (1830).—Perhaps, still, the best and indeed almost the only English account of the whole transactions of that period. But it was written at a time when the British feelings against everything Napoleonic were still strong; and, however well founded, they gave a tone to the record of all the events on either side. One can, however, separate the opinions from the record in Alison, which it is more difficult to do in Thiers, though he wrote fifteen years later.

THE ANNUAL REGISTER.—Is chiefly valuable for showing the opinions prevalent at the time both in Parliament and among the people generally; the extracts from Parliamentary discussions on important questions are particularly valuable. The records of particular events are sometimes very useful, but the details are in general insufficient for a full account.

CLODE'S Military Forces of the Crown (1869).—A very full and very useful compilation of all the legislation with reference to the British military forces of all kinds; specially advantageous to refer to alongside of the Parliamentary discussions, during those years, 1808–13, when so many schemes for recruiting were tried.

I have been much indebted to the assistance I have received from the Officers in the Intelligence Department of the War Office in examining the records of the Quartermaster-General's Department.

Considering the rising importance of military affairs, it is much to be wished that a complete *précis* of the records both in that office and in that of the Inspector-General of Fortifications of that period, were compiled; it would be of great assistance in the reorganisation of our forces on a more national basis.

I have also to thank the Officers of the Admiralty and of the Record Office, and last, but not least, of the Royal United Service Institution for assistance.

Récapitulation Générale du Personnel et du Matériel embarqués sur les diverses espèces de Bâtimens de Guerre et de Transport.

Personnel et Matériel.	Flotille de						Total.
	Chaloupes canonnières.	Bateaux canonnières.	Bâtimens de grande espèce.	Calques.	Bateaux pêcheurs armés de guerre.	Transports. Transports. de chevaux.	
Infanterie	30,132	39,744	1,512	2,160	3,240	..	76,798
Cavalerie	..	8,640	3,000	..	..	..	11,640
Canonniers	1,620	2,160	..	..	..	..	3,780
Charretiers	1,620	2,160	..	..	..	..	3,780
Non-combattants	2,592	3,456	108	..	..	3,240	17,476 ¹
							114,554
Chevaux	..	864	2,700	..	162	2,160	7,394
Fusils	8,748	11,644	1,458	..	2,187	..	32,837
Ballonnettes	6,480	11,644	1,080	..	1,620	..	20,824
Cartouches	3,888,000	5,184,000	648,000	216,000	972,000	..	13,900,000
Pierres à feu	388,800	518,400	..	..	97,200	264,000	1,268,400
Biscuit	388,800	518,400	64,800	21,600	97,200	311,600	1,434,800
Rau de vie	48,600	64,800	..	1,080	12,150	104,200	236,230
Outils	8,748	8,640	10,800	..	2,187	..	30,375
Moutons	1,298	1,728	324	108	324	210	4,924
Selles	..	..	3,240	..	..	4,320	10,560
Brides	..	..	..	..	..	4,320	7,320
Son	..	4,320	27,000	..	..	5,840	70,370
Avoine	..	4,320	27,000	..	810	5,840	70,370
Plâces de campagne	..	482	..	..	..	..	482
200 coups à tirer	..	86,400	..	..	..	..	86,400
Caissons d'Infanterie	..	..	..	..	..	88	88
Charrettes	..	..	..	..	..	176	176
Fourgons	..	..	..	..	..	88	88
Caissons de campagne	..	..	..	..	..	176	176

¹ Ce nombre de non-combattants devient trop considérable, mais on les remplacera par des hommes, n'importe de quelle arme.

From records, Quartermaster-Gen.'s Office.

Distribution of Regular Forces, June, 1805.

District.	Artillery.	Cavalry.	Regular Infantry.	Militia.	Totals.
North district	416	111	462	4,006	4,995
York district	130	563	631	2,906	4,230
East district	1,086	1,971	3,697	12,615	19,369
South district	2,290	4,835	15,785	16,874	39,784
South-west district	1,016	2,040	5,943	2,966	11,965
Isle of Wight	91	19	239	653	1,002
West district	382	622	1,250	5,061	7,315
Severn district	7	..	545	1,897	2,449
North-west district	..	93	660	..	773
North Inland district	..	200	669	..	869
South Inland district	..	186	103	..	291
London district	56	185	6,143	1,143	7,526
Home district	3,670	1,530	..	2,068	7,268
Channel Islands district	284	..	7,426	..	7,720
North Britain district	194	627	3,533	6,306	10,662
Total	9,622	12,984	47,116	56,316	126,028

From records, Quartermaster-Gen.'s Office.

Disposition of Volunteer Forces, November, 1803.

Counties.	Artillery.	Cavalry.	Infantry.	Totals.	To assemble at
North Britain	790	2,543	44,237	47,570	
Northumberland	210	1,351	11,411	13,672	
Cumberland. ...					
Westmorland ..					
Durham	168	1,709	15,805	17,182	
Yorkshire, Lincolnshire					
Norfolk, Suffolk, Essex, Cambridge, Huntingdon	84	3,393	18,989	22,466	
Kent, Sussex. ...	561	1,940	13,513	16,014	
Hants, Dorset, Wilts	1,229	2,303	13,549	17,081	Salisbury.
Somerset, Devon, Cornwall	1,602	3,318	26,147	31,562	
Gloucester, Monmouth, Glamorgan, Brecknock, Radnor, Carnarvon, Cardigan, Pembroke	..	794	15,516	16,310	Bristol.
Chester, Flint, Denbigh, Merioneth, Montgomery, Carnarvon, Anglesea.	520	670	9,174	10,564	Chester.
Disposable Force (not explained what this means).					
Surrey, Herts	50	1,715	11,089	12,854	
Middlesex, London.	..	42	36,838	36,880	
Oxford, Berkshire	..	1,185	6,061	7,816	Reading.
Northampton, Bedford, Bucks.	..	2,505	6,694	9,199	Aylesbury.
Rutland, Leicester, Warwick	..	1,221	7,094	8,315	Northampton. ¹
West Riding, Yorkshire ..	..	1,494	14,605	16,099	Wakefield.
Lancashire (except Liverpool), Cheshire (except Chester), Derby, Nottingham, Stafford	140	2,841	25,462	31,433	Lichfield.
Shropshire, Worcester, Hereford	..	1,570	11,324	12,894	
General total				327,286 ¹	

¹ These totals are taken direct from the book.

From James's "Naval History."

AN ABSTRACT of the Ships and Vessels belonging to the British Navy in the commencement of the year 1805.

Letters of Reference.	Rate.	CLASS.	For Sea Service.		For Harbour Service.		Building or ordered to be built.	Grand Total.	
			In Commission.	In Ordinary.	In Commission.	In Ordinary.		No.	Tons.
A B C D E F G H I	First	Three-deckers.	1	..	..	..	1	2	5,124
	"	120-gun ships	..	..	..	..	..	1	2,351
	"	18-pounder..	1	..	1	..	..	2	4,565
	"	12 "	..	1	..	..	1	2	4,575
	"	18 "	3	..	..	..	2	5	10,732
	Second	18 "	..	..	..	..	2	2	4,554
	"	"	3	..	..	..	..	3	6,363
	"	" 12 "	8	3	..	..	..	11	21,470
	"	" "	..	..	..	..	..	..	..
K L M N O P Q	Third	Two-deckers.	4	2	1	2	..	9	19,380
	"	80-gun ships	8	2	..	..	4	14	26,470
	"	24-pounder..	11	3	..	3	..	17	31,860
	"	18 "	11	..	1	2	15	29	50,266
	"	" "	19	13	..	12	1	45	73,214
	"	" "	13	9	8	7	..	37	51,152
	"	" "	..	..	..	2	..	2	2,511
	Fourth	..	83	33	11	28	26	181	315,147
	"	flush..	..	..	1	..	..	1	1,426
R S T U V	"	Line	..	..	..	..	..	1	1,176
	"	common, or quarter-decked	1	..	1	6	..	17	18,174
	"	flush..	9	1	..	..	..	2	1,823
	"	" "	2	..	..	..	..	2	2,680
	Fifth	" "	1	1	1	..	..	3	..

Abstract of the Ships and Vessels belonging to the British Navy in the commencement of the year 1865—continued.

Reference Letter	Rate.	CLASS.	For Sea Service.		For Harbour Service.		Building or ordered to be built.	Grand Total.	
			In Commission.	In Ordinary.	In Commission.	In Ordinary.		No.	Tons.
Fifth		One-deckers.							
W		44-gun frigate	4	..	..	2	..	6	8,304
X		24-pounder..	1	..	..	..	..	1	1,277
Y		18 "	4	..	..	..	..	4	4,657
Z		" "	13	2	..	2	7	24	26,249
A		" ..	10	3	..	2	1	16	15,996
B		18-pounder..	6	3	..	2	..	11	11,324
C		" " " " " "	14	1	1	2	4	22	20,231
D		" " " " " "	10	4	..	5	..	19	17,586
E		32 " " " " " "	5	..	..	..	..	6	4,542
F		18 " " " " " "	6	..	..	..	..	6	4,783
G		" " " " " "	3	..	2	2	..	7	5,654
H		" " " " " "	18	5	1	6	3	33	22,651
I	Sixth	" " " " " "	7	3	2	1	..	13	7,991
K		24-gunpost ship, quarter-decked..	5	..	..	2	..	7	3,693
L		" " " " " "	..	..	..	..	..	..	..
N		" " " " " "	1	1	..	..	..	2	1,130
O		" " " " " "	3	1	1	2	..	7	3,207
P		quarter-decked..	3	1	..	1	..	5	2,685
Q		flush " " " " " "	..	..	..	..	..	..	..
Sloops		" " " " " "	2	..	..	..	..	2	772
R		" " " " " "	10	1	..	..	1	12	5,118
S		18-gun ship-sloop, quarter-decked	19	..	..	..	2	22	8,381
T		flush " " " " " "	14	1	1	1	7	24	9,053
U		quarter-decked, large	3	..	..	..	..	3	975
V		" " " " " "	14	..	..	..	..	14	5,048
W		flush " " " " " "	2	..	..	2	..	4	1,174
X		quarter-decked	13	..	..	..	..	13	3,788
Y		flush " " " " " "	20	..	..	..	9	29	11,114
Z		18-gun brig-sloop ..	7	..	..	1	..	8	2,613
		" " " " " "	..	..	..	..	..	..	..

Abstract of the Ships and Vessels belonging to the British Navy in the commencement of the year 1805—continued.

Letters of Reference.	CLASS.	For Sea Service.		For Harbour Service.		Building or ordered to be built.	Grand Total.	
		In Commission.	In Ordinary.	In Commission.	In Ordinary.		No.	Tons.
		No.	No.	No.	No.			
d	Sloops, 16-gun brig-sloop	12	..	..	2	..	12	3,650
e	" 14 "	3	..	..	2	..	5	1,200
f	Bombs of 8 guns and 2 mortars	17	..	1	2	..	20	7,108
g	Fire-ships, 14 guns	1	..	1	..	..	2	668
h	Gun-brigs, 14 "	8	..	..	..	..	8	1,626
i	" 12 "	73	..	..	..	7	80	14,090
j	" 10 "	2	..	..	..	..	2	321
k	Cutter, &c., 14 "	4	..	..	..	1	5	926
l	" 12 "	8	..	1	2	..	11	1,635
m	" 10 "	13	..	..	..	12	25	2,956
n	" 8 "	1	..	..	..	..	1	98
o	" 6 "	2	..	..	..	..	2	184
	" 4 "	16	..	..	..	..	16	1,232
	Cruisers	473	61	26	73	80	713	586,065
q	Troop-ships	14	7	3	14	..	38	34,598
r	Store-ships	10	1	..	2	..	13	7,579
w	Gun-vessels, from 1 to 4 guns	5	..	..	..	..	5	655
x	Advice-boats and tenders	6	..	..	..	..	6	964
y	Sloop on discovery	..	..	..	..	..	..	..
a	Hospital, prison, receiving ships, &c.	..	..	10	15	..	25	29,757
b	Royal yachts	..	..	6	..	1	7	1,288
	Troop ships, &c.	35	8	19	31	1	94	74,841
	Grand total	508	69	45	104	81	807	680,906

Evening Meeting.

Monday, January 17th, 1876.

Rear-Admiral G. O. WILLES, C.B., in the Chair.

NAMES OF MEMBERS who joined the Institution between the 1st and 17th January, 1876.

LIFE.

Hamilton, Tynte F., Lieut., R.N.

Chamberlain, Henry Lieut., R.N.

Sharp, W. Granville, Capt., Madras Staff Corps.

ANNUAL.

Walker, A. G., Lieut., R.A.

Cuttler, Frederick F., Lieut., late 1st
W. I. Regiment.

Warry, Alfred W., Lieut., R.N.

Germon, R. C. H., Major, 9th Regiment.

IS OUR MERCHANT SERVICE ANY LONGER A FEEDER TO THE ROYAL NAVY?

By Captain J. C. WILSON, R.N.

To the uninitiated, the title of this paper may appear absurd as, in all probability, they accept as gospel the statement so often made in after-dinner speeches, that the greatness of England mainly depends on an efficient Navy manned by seamen, who can never be wanting so long as our flag floats on every sea, and our mercantile marine is the largest and finest in the world. Such statements, made or delivered fifty years ago, as no doubt they were, may have been perfectly true, as then the mainstay of the Navy was undoubtedly the merchant service, and on the Navy, England depended for security at home and respect abroad, but reliance must no longer be placed on the mercantile marine as a feeder to the Regular Service, unless some very radical changes take place, though it still contributes to the Naval Reserve, a corps which bears the same relation to the Navy, that the Militia does to the Army, except that it is very inferior in drill and discipline to that force, and can only be called on to serve *during* war, but not in time to *prevent* a war. Before the Russian War, the Navy was almost entirely dependent on the merchant service for men, but, as that source signally failed, continuous service was introduced into the Navy, with the system of training boys to keep up the supply, thus superseding the old plan so entirely that, for some years past, the entry of men from the merchant service, has been considerably under a hundred per annum. Various reasons are assigned for this falling off of volunteers for the Navy—for it must be borne in mind that the door has always been kept open to them—the most common being the scarcity of men caused by the abolition of apprentices. This, though no doubt one, is certainly not the only, or even the chief cause.

In my opinion, the principal reasons are—first, that as the supply of seamen has fallen short of the demand, wages in the merchant service have steadily increased, whereas the pay of the Royal sailor has not kept pace with it, and for the merchant seamen who may try the Navy, the pay has remained absolutely stationary for the last seventy years. Again, the Royal Naval Reserve has the effect of keeping men out of the regular service, for they can hardly be expected to serve in a man-of-war for £24 a year, when they can get considerably more in a merchant ship, in addition to £10 from Government,—actually given to men for remaining away. The expense also of an outfit on joining, is out of all proportion to the small pay our men receive, and necessarily places them in debt for at least their first year of service, whilst the doing away with the two months' advance, formerly given on joining, renders it often impossible for a man to pay off debts incurred whilst waiting for a ship, and causes that powerful class of land-sharks—the crimps—to be dead against us. These, I believe, to be the chief causes operating against men entering the Navy, though there are many others of minor importance. As I have shown in a former paper, read in this theatre,¹ we have at present, as the result of our training and continuous service system, but 12,000 *able* seamen in the Fleet. Were this the result of the beginning of a system, it might reasonably be supposed that with time the number of able men would increase, but such must not be anticipated, for, though the training of boys has been in full force for the last ten years, we still include amongst our 12,000 A.B.'s, many who joined as *men*, either prior to, or since the introduction of, the present system, and we must be prepared, when these are gone, to see our force of 12,000 dwindle down to probably less than 10,000, which will be about the normal number of able seamen produced by our training establishments. We see now that 3,000 boys have annually to be entered to maintain a force of 18,000 or 19,000 blue jackets, of whom only about half are thoroughly qualified seamen, the remainder being but learners, and in many cases little better than boys.

But is the Navy as at present maintained able to train as *sailors* all the men it requires? Let us see. To keep up the number of men now voted, 4,000 boys, first-class (*viz.*, boys who have passed through the training course) are required, but all our ships put together do not take more than three-fifths of them, the remainder being cooped up in harbour vessels, learning little but evil. It is thus clear we have not nearly the requisite *tonnage* at sea to salt our youths properly—a state of things most detrimental to them, and the service at large; in short, we have to keep more men than the ships of the Navy can possibly make into sailors, and the sooner the fact is boldly faced the better, for no half-measures will remedy this most serious evil. We now come to the question whether, with only sufficient ships at sea to absorb about 1,800 boys a year, it is advisable, so to speak, to swamp the service with 3,000? As the Navy is at present worked, it

¹ "Seamen of the Fleet, &c.," see Journal, Vol. xix (No. 83) page 604, et seq.

is necessary to enter them, because the profession is self-dependent and with no other source from which men are obtained; but is it absolutely unavoidable that such an unsatisfactory state of things should continue? and is there no solution to the difficulty? There can be no doubt that the Navy should train as many of its men from boyhood as possible, but there is a limit to its power of so doing, and that limit should not be exceeded. Some fifteen hundred boys per annum can be conveniently and advantageously disposed of in the ships usually kept at sea, but any excess of that number only injures the sea training of them all.

How the remaining 1,200 or 1,500 men needed to keep the Navy effective are to be found is a question as yet unanswered, and, as usual, the main difficulty in matters of this sort is *money*; so, unless I can suggest a means by which men can be had as good, and as cheaply, as those manufactured for the Navy, I fear things are likely to be allowed to remain in their present defective condition; but I am confident that men can be got who would, on the whole, be quite as good as the average of our young hands, whilst possessing more *nautical* experience, and who would have cost nothing for training. Seamen now, to be of real value in war, should be (as I have attempted to show in my former paper) thoroughly drilled and disciplined as fighting men, but this cannot be done without barracks, I therefore take it for granted that barracks will ere long be constructed, as they are already recognised as an *imperative necessity*, without which the men of the Fleet never can attain to that high standard of efficiency which the country has a right to expect, and the present exigencies of the service require. With barracks, the great difficulty to entering *seamen* direct will disappear, for in them the young merchant sailor can be so completely disciplined and drilled that he would no longer be looked on as the objectionable character he has hitherto been considered on board of a man-of-war. In entering such men it would not do to be too particular in their nautical examination, as many things required of a sailor in the Royal Navy are not thought necessary in the merchant service; and it should be borne in mind that there are certain parts of a seaman's work which can be perfectly well taught on shore, whilst there are others which must be learned afloat. Two qualities absolutely necessary, but only to be acquired in youth, and on the salt water, are *sea legs* and a *sea stomach*, and a man possessing these might, in considerably less than a year under careful instruction in barracks, be transformed into a very fair man-of-war's man. There are other qualities of course essential to good sailors, such as readiness of resource, self-reliance, activity, and determination, which are so much developed in the man, by actual work aloft, that sea training should always be imperative on candidates for entry. In barracks therefore, I would drill the additional men necessary to keep our blue jackets up to their proper strength, and therein qualify them for their duties as men-of-war's men. I am aware I may be met with the objection, that seamen cannot be got from the merchant service, but this difficulty can, I believe, be overcome. In the first place, to do so we must make the Royal Naval Reserve the *link* between the Royal,

and merchant navy, not leave it, as it now is, the *gulf* which separates them. If we can attract a certain number of men regularly from the merchant service, we should soon find ourselves in a position to insist on a qualifying period of service in the Fleet, before they could pass into the Reserve, thus immensely increasing its value, as those composing it would then be all disciplined, *tried* men, to whom the duties of a ship of war, when they were required to join the Navy, would be neither unusual nor irksome. There should also be easy means of interchange between the two services, so that a man could serve for a time in the one, and then pass into the other, *three* years in the Reserve, counting as *two* in the regular service, towards a *non*-continuous service pension. At present, if a Naval Reserve man joins the Navy, he is a positive loser. For instance, in a Frigate I commanded in South America, I had four Naval Reserve men; they were all stout good merchant seamen, who soon fell into our ways, and were thought well of, but in less than a year three out of the four had deserted, simply because they could not afford any longer to serve Her Majesty on £14 a year, for such was the practical result of giving them £10 whilst out of the service and only £24 when in it. Had these men been allowed to draw such portion of their retainer as would have made up their pay to that of their continuous-service brethren, they, in all probability, would have remained in the service contentedly until the ship paid off, when, if they returned to their former calling, as the chances are they would, they at any rate might be expected to speak favourably of their experience in the Royal Service, and have been a valuable addition, instead of being lost, to the Reserve. I may add that the fourth man rose to be a leading seaman, and, on paying off, I asked him whether he intended to rejoin the Navy, he replied,—“I like the service, but at my age (thirty) it would not pay me to do so.” I hold that nothing short of absolute necessity should induce Government so completely to alienate the merchant service from the Navy. At present, in the Reserve, there *is* a certain proportion of men who have served in the Fleet for short periods, but unless some encouragement is offered to the merchant seamen these will soon disappear, and leave the Reserve entirely composed of men who know nothing whatever of the routine or duties of a man-of-war. There is a strong natural antipathy in the merchant sailor to the Navy, which is only to be removed by serving in it, or modified by hearing it well spoken of by those who have; but when the whole body is composed of men who know nothing of a man-of-war, it can hardly be expected that the Royal Service will become more popular with them than it is at present. I have heard it said that it is better that the Naval Reserve men should not serve in the Fleet in peace time, as their doing so reduces our resources in case of war. If *quantity* and not *quality* were the only consideration, such an argument might hold good; but *quality* is certainly now-a-days of the first importance, and unless a seaman is *thorough* in *drill* and discipline he is not worthy of being estimated at anything like full value in the fighting power of the Fleet.

But cutting off the merchant seamen from the Navy is felt in-

juriously in other ways; the good feeling which formerly existed between the two branches of the profession is fast vanishing, the *man-of-war's* man is no longer looked on by the merchant sailor as a bird of the same feather, but as one of a totally different order, and this feeling extends from them to their Officers, who, in former times, if not interchangeable like their men, at any rate became familiar with the Navy from hearing, in their youth, the experience of the old salts with whom they sailed, and who had seldom passed a long life at sea without having spent a considerable portion of it in a ship of war. I would even go further, and should like to see a qualifying service in the Navy imperative on all future Naval Reserve Officers, such service would be a clear gain to all parties, for the Officer would learn his naval duties, the Admiralty be able to estimate his suitability, and value as such, and thus be in a position safely to reduce the number of Officers in the regular service, which would both save the country's money, and remove to some extent that incubus, "Half-pay," which I have no hesitation in saying, does more harm to the profession, than it is possible to estimate; but the greatest of all the advantages to be derived from the connection, would be the sympathy, and the good understanding engendered by it. At present, merchant Officers look on us, I fear, as mere drawing-room sailors who may possibly know the bow from the stern of a ship, but not much more. This unfavourable opinion would not so much matter were it not, through them, transferred to their employers, and other mercantile classes, and thus diffused throughout the country, till, as a result, confidence in the Navy is shaken, as we too often see by the tenor of the articles, written on naval matters, in the leading journals. If merchant Officers were brought into contact with those of the Navy, they would find such opinions, if entertained, to be unjust and erroneous, and that there are proportionately as many practical sailors serving the Queen as in their own branch of the profession, for though the training in the Royal Service may not be so rough as theirs, still Naval Officers are not only always ready, but quite as able to do any part of a seaman's work as the most hardy Neptune in the Australian trade. The time for keeping the Navy a close borough has past; within proper limits we should put out our hand to those who, like ourselves, follow the sea; for the ranks of the merchant service now hold officers of as good social position as our own, gentlemen both by birth and education. What is required for the Navy is more *light*, nothing should be kept dark, the more the public and Parliament know of it, the better for us all. Now we are principally known and judged of by our shortcomings or unfortunate accidents; but the important services, and hard work done by the Navy, though of every day occurrence, is but little heard of or considered: were it otherwise, we should not be so roundly abused for things which are too often beyond our control. But to return to the seamen.

How are we to induce merchant sailors to join the Navy? certainly not by offering them a bounty, for experience has shown that that does not answer. There appears to me, however, to be another way we may get them to join, viz., by allowing their sea time *out of the service* to count towards a non-continuous service pension, to be earned by a combination

of service *in and out of the Navy, and Reserve*, for a period of 21 years or its equivalent, *irrespective of age*. Thus, I would allow a *seaman* under twenty-five years of age to count *half* his time *served at sea*; between that age, and thirty, *two-fifths* of his sea time, and so on to an age limit; but I would allow *all* time *served* in the *Reserve* to count as *two-thirds* time. Men entering the Navy with a view of passing into the Reserve should also be allowed a free kit *credit* on the books, equal to that now given to boys on entry and before passing into the fleet, viz., £7 10s. for clothes, and £1 for bedding, which would enable them to commence their service clear of debt, and allow of their drawing pay from the first.

The above proposal may appear at first sight too liberal, but it must be remembered that the country would have the benefit of all *man's* time for the entire period of his service, and have paid nothing whatever towards his training as a *sailor*; in fact we should get a ready-made article instead of having to manufacture it. The Naval Reserve men should be encouraged to come and go as much as possible; when in the Fleet, they should be paid as continuous service men, the only difference between the two classes being the pension. Such a system backed by other minor inducements, such as allowing the men to carry their conduct and gunnery pay with them, exempting them from the re-qualifying course excepting once in three, or five years, but allowing the men to draw their ration money, and considering them eligible for the coast guard, when their *combined service* qualified them for it, would probably induce a number of staid and experienced seamen, (a class of men the want of whom is much felt in the Fleet) as well as younger men, to join, for it often happens that it is convenient for the Reserve sailor to join our ships abroad, and for us to take him. Besides, as these men get older they begin to look ahead, and are then pretty certain to see the advantage of reducing the time between them and a pension, by putting in a few years in the Navy as opportunities offer. It would hardly be fair, seeing how short the mercantile marine is of men, to introduce the proposed scheme unless the Government in some way or other made up for the men which would be absorbed by the Navy; but I think we may reasonably anticipate that the New Merchant Shipping Act will amply provide for this, probably by furnishing ships in which boys can be prepared for service in the mercantile marine; if so, such vessels,—to be thoroughly efficient,—should be put under one system of instruction, and be periodically inspected by some competent person, whose report would enable the Board of Trade, or whatever department they are placed under, to form a proper estimate of the work they are doing.

It is not my intention here to enlarge on the subject of training boys, but there are one or two important points I should like to touch on in passing in view of the establishment of these nurseries for seamen. The best age to take a boy for making a sailor is about 14½, but the most *paying age* is a year or eighteen months older, that is to say, the *bulk* of boys joining at the younger age will stick to the sea, and become excellent seamen, but the older they are taken the larger is the proportion of loss, until we reach those who enter as

young men, and who seldom turn out well, or remain at sea if they can leave it; but the difference of waste between the boys of 14½, and 15½, is not equal to the additional cost of maintaining the younger class for the extra year. Thus the regulation age should be from 15½, to 16½; over, or under these ages the expense is increased. Seamen, now that so few are carried in proportion to tonnage, must be both strong and able, therefore there should be a standard of size, as well as a physical examination before entry, and as young boys are growing fast, they should be well and plentifully fed, so as to develop to the utmost both their bodies and minds. Eighteen months is the *maximum* time a boy should be kept in a *harbour* training ship, after that they only lose ground, and become discontented. But as lads of between seventeen and eighteen will often be too light to get berths in merchant ships easily, they may have to be *sent* to sea, rather than be retained too long in harbour, in carefully selected ships, under humane and experienced captains, who might receive in remuneration a sum equivalent to the value of their rations. The custom of carrying premium boys is now becoming so universal, that this course will probably be found imperative; but I do not anticipate that there ever will be any difficulty in competing with them, as they labour under the disadvantage of being entirely uninstructed, and therefore very inferior as compared to the trained youth. After, say a voyage to India, *viâ* the Cape, or to Australia, such lads would, as a rule, be quite fit for an ordinary seamen rate, and be much sought after. By sending boys thus to sea, no extra expense would be incurred, as it is obvious that whether retained at home, or sent to sea, they must be fed.

Having roughly sketched out how in my opinion the Navy might be benefited and placed in more intimate connection with its Reserve, and through it, with our great mercantile marine, I will proceed to make a short summary of what I have written:—

1st. The Navy is now self-dependent rearing its blue jackets from boys, numbering 19,000, of whom but 12,000 are able-bodied seamen.

2nd. As sufficient ships are not kept at sea to carry more than three-fifths of them, the seamen-like qualities of our sailors are rapidly deteriorating.

3rd. The sea-going ships of the fleet only carry about three-fifths the boys required to make good the loss on the blue jackets of the Fleet.

4th. It is, therefore, desirable to draw *seamen* from other sources, rather than swamp the Navy with more boys than it can possibly instruct.

5th. That the mercantile marine must again become the nursery from which we should draw a proportion of our *seamen*, to be disciplined, and moulded into men-of-war's men in *barracks*, before being embarked.

6th. That for many weighty reasons it is bad policy to alienate the merchant service entirely from the Navy, and that our present Naval Reserve system has that injurious effect.

7th. There should be established means of easy interchange between the Reserve, and the regular Service, three years in the

former, to be considered equivalent to two in the latter flying service in the Fleet required of both officers and men.

8th. That the whole should be linked to a comprehensive training boys for the Merchant Service, under proper supervision.

These are the main points put forth in this paper: the discussion on it to clear up any uncertainty as to which from want of detail may not be perfectly clear. ever I am certain, the Navy, if kept at its present long continue to make its own sailors without aid from attempting to do so will prove most injurious to the service.

We cannot tell in a naval war what number of men required, and therefore if our men were even better, as than they are, we should do well not entirely to be content with the cantile marine of the country. It must be remembered that an inferior naval power gets the start of us in what half a dozen fast cruisers to prey on our trade (which we certainly are not *always* prepared), our men surely take refuge under neutral flags; and as all the men invariably follow the ships, go where the press-gangs would be equally powerless to touch them. This was clearly demonstrated during the American Civil War, when our commerce, second only to our own, passed all under neutral flags; their ships-of-war, however, remained without success though an enormous bounty was offered, and with foreign merchant sailors, or deserters furnished by some twenty thousand landmen, to man them.

It is no new idea to form our Reserve from the fleet; pamphlets have been written by admirals; committees, both Parliamentary and Government, sat on the subject; blue books have been published; and it has been made to do so, or even to secure the services of years' men, who at their prime, and when considerable numbers out of the Navy, and are steps being taken to secure their services in the future. It is able to judge, consider our Reserve as far from satisfactory, whilst we hear it spoken of as "pensive," and doubts expressed as to its "come forward except by compulsion." It is fair to add, that many intelligent officers regard the Reserve in the highest terms as a reliable force. I believe the difference between these two extremes, and that the Reserve is a good, many bad points. At best it is a body of men trained to arms, and composed of men though undoubtedly good sailors, and men composing the Reserve had all passed through the *prospect of war* would be inducement enough to our ships; but for men of a certain age, and habits, to take to a new life with equal ease, of the nature we have yet to see, to believe in

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Can we, or should we, thus rest contented when a *doubt* on such a *vital question* exists? are we to wait patiently until war solves the problem, possibly by involving the country in some great calamity? I do not doubt the honesty of purpose of our Reserve men, for they probably are quite sincere in their promise to serve in war; but after all they are but human, and are certain to be exposed to great temptations to break their contract. The link between them and the flag they are to fight under must therefore be made stronger, let them all be *proved* men with something to lose; *self-interest* can *always* be depended on, *honour* only *at times*. I have no wish to see new measures made retrospective, indeed there is no reason why, at any rate for a time, old and new should not be *worked* together. It would be no hardship, but much to the advantage of the young men coming on, to pass a few years under the pendant, before going into the Reserve, and the same may be said of the young merchant officers. These gentlemen, when Sub-Lieutenants in the Reserve, should be required to serve for six months in one of our Channel, or Mediterranean ships, before being qualified for promotion to Lieutenant's rank; the report from the Captain they were under to be considered, in combination with their other services, before they received promotion. We could not expect great results at first, but I feel confident that if the matter were taken up with energy, if Naval recruiting parties and rendezvous were established at our principal sea ports, we should in due time succeed in entering all the men we require. The continuous service system should be maintained in full force within proper limits, which I roughly estimate at from 14,000 to 15,000 men, the remaining three or four thousand to be short service men, qualifying for the Reserve. As the time required of a Reserve man to entitle him to a pension is long, I would like to see him allowed to earn a *part of it*, when unable to serve for it all—thus, if a man had, after putting in ten or fifteen years, to leave from any good reason, I would grant him a proportionate pension at the *age of fifty*. The rule about men following the sea whilst in the Reserve might also, with advantage, be somewhat relaxed in favour of those who had served ten years in the Navy, or its equivalent in the Navy, Reserve, and merchant service; if such men lose by remaining on shore—which I doubt—for once a sailor always a sailor, the country would be the gainer, by having a body of experienced men always ready to hand. I do not place any great importance on frequent requalification in drills. If the men have passed through the Navy, and have once been *thoroughly* trained to arms, they can at any time be made efficient in a few weeks, so long as they are physically fit.

If England is really in earnest and jealous of the supremacy of her flag on the sea, if she really believes that on the Navy, "under the good providence of God, the wealth, the safety, and strength of the kingdom chiefly depends," she must, through Parliament, look carefully to it; it will be useless condemning the officers or even the Admiralty, if, when the evil day arrives, the arm on which the country confides be found wanting, the fault will surely lie with the *public*, and not with the *profession*, for is not *vox populi vox Dei*?

Captain WILSON: Before commencing the discussion I should like to add to what I have written a few notes which I made from the report of evidence taken before a Departmental Committee in 1871, but which was not published. From the report itself I take this:—"The total number (Reserve Seamen) removed from "the register by death, discharge, &c., since the formation of the force amounts "to upwards of 13,000. It has been given in evidence that most of the able "seamen of the mercantile marine, who are eligible by the regulations, have "joined the Royal Naval Reserve, and this statement has been confirmed by "the Registrar-General of Seamen." We then go on to evidence given having reference to the question of men passing out of the Navy into the Merchant Service, which some people think is so likely to occur if we allow them to go on the short service pension. Here is the evidence of a Quarter-Master and five seamen—*young men-of-war's men*—who had been educated in the Service, and who were of opinion that young seamen would dislike the idea of leaving the Navy for the Merchant Service. Individually they had the strongest objection to serving in the mercantile marine. A captain in the Merchant Service being asked what he thought of the Reserve men says, "I think they are a very mixed class. I have had them "myself and I have found that some of them are very good men and others quite the "reverse." Then in speaking of *men-of-war's men* passing into the Merchant Service he says, "You can make *man-of-war's men* out of merchant seamen, but you cannot "make merchant seamen out of *man-of-war's men* as a rule; of course there are "exceptions,"—in that I quite agree.

I have also some notes which I am sure will carry very great weight with you all. The evidence given by our very dear and lamented brother-Officer, Commodore Goodenough (and I take the opportunity of offering a humble tribute to his memory, by saying that the Service could ill afford to lose such an able and such a good man) he says, "Again, I think that the present system of "our Reserve is exceedingly expensive, and probably very ineffectual. The real "Reserve should be composed of men who have been trained in the Service, and "have gone through their five or six years in the Navy. Instruction and time is "thrown away in accumulating men on your lists, who are not first rate, in time of "peace." Then I go on to some evidence given by Captain Gore Jones, who is a good authority on these subjects. He says, "The great mistake with us has always been "having no permanent establishment like the army. We see from the Accountant-General's statistics," and this is a part which is very noteworthy, "that in nine years "the numbers have decreased from 32,000 pure seamen to 19,000, without any "apparent cause." I think that is a very strong point. There is another little item that I draw your particular attention to, evidence given by a very intelligent Officer with reference to the comparative merits of boys trained in the private training ships, and those in the Royal Naval training ships. Captain Cuming served as captain of a Royal Naval training ship, and also as captain of a private training ship. A question is asked him as to the relative merits of the two classes of boys (ignoring gunnery altogether) simply as to discipline, clothing, and their abilities as seamen, and comparing boys of two and half years standing in the private training ship to one year in the Royal Naval training ship.

Q. "Apart from the knowledge of gunnery drill after two and half years with "you,"—he was then commander of a private training ship,—*"and after a year's "training in one of the Queen's ships, what is the actual difference as far as seaman- "ship goes between the two classes of boys?"* His answer is, "A boy from the "Queen's training ship would have a much better knowledge of the theory of seaman- "ship, and certainly of the practice." I want to draw attention to this as I think there is an idea abroad that because these private training ships keep the boys at per 19*l.* to 22*l.* a year, their training is cheap compared with what we give in the Royal Navy; this notion I think Captain Cuming's evidence upsets. I will go on to the evidence given by a very noted sailor in our Service, who ought to know what men are, Sir William Mends, now at the head of the Transport Department. He says, in answer to a question about Reserves, "It is certain that you will always "have to fall back upon the mercantile marine in time of need. At present the "mercantile marine and the Royal Navy are quite distinct, the line is cut between "them. You have nothing now to associate the Naval Service with the mercantile

"marine. If man-of-war's men, whom we could not find employment for in our ships of war, went into the mercantile marine, and constantly passed to and fro, so that a certain link was kept up, the seamen of the mercantile marine would gradually lose their distaste for the system of discipline necessary to the condition of the Royal Navy." Then in answer to another question he says, "The merchant seamen see nothing now of ships of war except the outside. The men forming the Royal Naval Reserve are drilled in ships specially set apart for the purpose, and which form no part of the active Fleet. I think the continuous service system is very good for the Navy in its normal condition, but very disadvantageous to the country in time of war." And in speaking of requalifying drills he says, "Those men who have had four or five years on board ship are soon brought up to the work again." The question is also put to him, "The transition from peace to war being momentary, is not that one of the objections, and a serious one to our Royal Naval Reserve?" He answers, "Of the 15,000 men we should not have in the summer time more than 4,000 in England: the others would be on the high seas."

Commander W. DAWSON, R.N.: There is one great advantage to the country in "half-pay" which has been overlooked by Captain Wilson, namely, that we are indebted to "half-pay" for the very able and interesting paper which we have heard to-night. Naval Officers when afloat spend a great deal of what is called "sea-time" in, and devote a great deal of exhaustive "sea service" upon, washing decks and scrubbing hammocks; but when relieved from those intellectual labours and allowed a period of learned leisure on half-pay, or of employment on shore, they can devote their talents to subjects of greater importance to the country than those not very recondite occupations which go to make up "sea time," and I hope that whatever learned leisure Captain Wilson may have whilst on half-pay, may be devoted to the further development of the principles which he has enunciated in connection with this most important subject, for at present he has but touched the fringe of a very large question, and one which would well repay the devotion of Captain Wilson's talent and experience to elaborate more fully.

The question which he has put before us is, "Is our Merchant Service any longer a feeder to the Royal Navy?"

He appears to restrict this question to peace times and to fixed numbers, and if we are to confine our attention within such limits our reply must be that, "of course it is not a feeder to the Royal Navy;" and I would add, "why should it be?" Why should not rather the Royal Navy be the feeder to the mercantile marine? The Merchant Service at this moment cannot raise seamen enough for itself, and when it has got them it cannot keep them. When they become good and decent men, the first thing they do is to quit the Merchant Service, which, speaking roughly, and ignoring some most praiseworthy exceptions, is so badly managed that no decent man who has any respect for himself can belong to it, unless he gets into one of the more favoured employs, or is driven by poverty to put up with bad food, bad housing, and a depressing mode of payment. Consequently there is a very large secession of good and decent men always going on from the mercantile marine who are taking to employments on shore. There is also another reason why the mercantile marine wants assistance given to it rather than to give away its best young men to the Royal Navy, viz., that steamers are greatly increasing in number, and merchant steamers do not train up seamen, although they use them when trained. On the contrary, large proportions of the crews of a great number of these steamers are made up of Lascars and of the sweepings of mercantile sea ports, so that there are not so many persons under early training for British merchant seamen as we should naturally suppose. If we could in any way persuade men, who have served in ships of war, subsequently to serve in the mercantile marine—which I think is very doubtful indeed, so that I am not very hopeful of the plan proposed in that respect—if we could, however, then I should say the better plan would be rather to make the Royal Navy one great training establishment for the whole marine of the country. But it is answered, "we have not enough ships of war at sea for the purpose of training the boys required for the Queen's Service alone." Well, who else is going to train men for the Navy if the Navy does not do it for itself? and who is best able to pay for Royal Naval training? the country with all the taxes at its back, or the private shipowners? I say at

once, if you have not enough vessels at sea to train your boys, pay off some of the harbour ships which are constantly merely lying round the coast. It would be a great advantage to the Service if the number of harbour ships were greatly reduced. Then as to barracks, I don't think you will get barracks for the Navy till a batch of those demoralizing hulks, which destroy discipline and spoil men-of-war's men, are burnt. Even then decent barracks will not be given to the Navy. Nobody wants to have them in the form of disused old storehouses in the dockyards, without any drill ground or any other decent appliances, such as would enable Officers to discipline and to drill their men efficiently. The real question covers a much larger ground than the title of this paper. Peace time is simply a preparation for war, and the question is not merely how to man the Royal Navy in time of peace, but how to provide such a greatly expanding force as will be required to defend our commerce, our colonies, and our homesteads in time of war. When Captain Wilson asked on a previous occasion, "what are the number of men wanted in time of 'war'?" he was answered by a very distinguished Officer that we have now more seamen than we have ships of war to put them into.

The CHAIRMAN: For the moment!

Commander W. DAWSON: For the moment! But in case of a great maritime struggle there is hardly a single seaworthy merchant steam-ship into which you could not put one or more 64-pounder guns. The Naval architect would not be worth his salt who could not do it. Surely if a heavy gun can be placed upon a raft it could be put into any seaworthy merchant steam-ship afloat. If Naval architects cannot build up a cradle or other framework inside of any gingerbread merchant ship capable of keeping the seas so as to carry 64-pounder guns, all I can say is they have no business to be called Naval architects. Every merchant steamer which has a speed of more than six knots could also be employed as a torpedo ship, therefore every single seaworthy vessel in which there is a steam engine can be used as a war vessel in any great maritime struggle for national existence. Besides, in the last war some of the best fighting ships we had were taken from the enemy, and that is a source to which we must look for getting many of our best fighting ships in time to come. But we want well-disciplined and well-drilled men to fight these ships. Mere seamen without discipline and without warlike training in the arts and arms of war do not form a fighting force, what we want is not mere sailors, whether amongst Officers or men. It is not so much mere seamanship as intelligence that is wanted on the quarter deck, and skilled fighting men before the mast. And fighting men who have the skill to fight in bodies, means discipline and drill. Thus we come round to very much the same conclusion at which Captain Wilson arrives, though they are reached by a different road. Has not Captain Wilson been led into a little contradiction in speaking of the qualities of the present Reserve men? Captain Wilson speaks in the highest terms of praise of the four Naval Reserve men serving in the frigate which he commanded; but since he was afloat he has evidently been reading some of the late Mr. Reddie's papers, and has taken up some notions from those who are opposed to that fighting force. All I can say is, "a bird in the hand is worth two in the bush." You have now in the Naval Reserve, so far as they go, the pick of the mercantile marine. Be they bad or good, they are the best men in the whole Merchant Service. The mercantile marine may contain far too many unseaworthy sailors; but those men in the Reserve are at any rate the best, or if you choose to put it otherwise the least worst of those in the Merchant Navy. And having got these Naval Reserve men drilled, it may be with obsolete guns and with obsolete carriages, still gaining a modicum of discipline and under a certain degree of control, you have a bird in the hand which can be depended upon when the country is in an emergency. It is quite true, that under the conditions made with them the Naval Reserve men cannot be called out till the emergency arrives; but get this other Reserve which you speak of if you can, and do it without breaking faith with the old. We must recognize this fact that we shall want every man and boy who is serving afloat for the defence of the country when the struggle comes for national existence, that death-struggle which must be fought out not on Dorking heights, but on the high seas; and if that be the case, the Government ought to come forward and claim a sort of oversight over the whole of the personnel of the mercantile marine. A great

many abuses which are now driving from the British Merchant Service its best men, and which are demoralizing and debauching the rest, could be immediately stopped as they have been in the Queen's Service by the regulations of a Government, which looked upon merchant seamen as persons who are in process of being trained and qualified now in time of peace for the defence of the country in time of war. In that way Captain Wilson's system might very well be elaborated and made to work out. But it would be silly on our part to expect merchant seamen to come into the Royal Navy unless some very large increase is made to the wages of the men of the Royal Navy. An A.B. of the Royal Navy is receiving 2*l.* 0*s.* 6*d.* per month, while an A.B. in the mercantile marine is receiving in the port of London at this moment 3*l.* 10*s.* per month, and if coming home from Australia he gets 8*l.* per month; and although it is quite true that there are only nine or ten months wages in the year for the merchant seamen, he does not always count up the months: and though there are no twopences or threepences for badges of various kinds to add to it as in the Royal Navy, still there is the plain naked fact, that he will get 1*l.* 10*s.* a month more by remaining where he is, than by entering the Queen's Service. This question of the wages of men-of-war's men has always been treated in a very scurvy way. In the Royal Navy, an ordinary artificer is given 9*l.* a year more than is given to a first-class seaman Petty Officer, or nearly twice the rate of wages given an able seaman of the Navy. Surely an able seaman is a skilled workman who ought to be paid the wages of a skilled workman. A first-class seaman Petty Officer is a man who has risen through two or three grades above an able seaman, and that, even after so rising in trustworthiness and skill, he should be receiving 9*l.* a year less than a shipboard ordinary mechanic, seems to me one of those things that wants rectifying. I do not believe myself that there is any very bad feeling between the Royal Navy and the Merchant Service. The members of the mercantile marine have had nothing to do with the published attacks lately made upon the Navy. Those animadversions are a great deal the fruits of what Naval Officers themselves have sown; they have told the world that Naval Officers were nothing but seamen, mere sailors that knew one end of a ship from the other, and knew nothing more, and that ignorance is the handmaid of seamanship, and that knowledge of affairs or of science was inconsistent with the skill to command fleets and fight battles; and they have been taken at their word, and have been very naturally treated by successive Governments and by the public, as men wanting in intelligence, incapable of holding positions of responsibility, and as, in short, the poor relations of the Army and of the Civil Service. On the contrary, the Naval Reserve has contributed to the growing good feeling which obtains between the employes of the merchants and of the Queen; they see something of the Navy and of its Officers in the drill ships, and this contact contributes a good deal towards mutual good feeling. At any rate, whatever the Naval Reserve are, they are a good bird in the hand, though they are wholly insufficient in numbers. I would, therefore, welcome any broad comprehensive and statesman-like grasp of the question of maritime defence, which would embrace the whole mercantile marine amongst the defensive forces of the country. We do need a much greater and more complete link between the Naval and the mercantile marine than we have at present; we do not need a more fostering, discriminating, and national Government control of that Service. Merchant seamen do not stand in the same national relation to the country that cabmen or colliers stand in, because cabmen and colliers are not men who are placed foremost in the defence of the country; but say what you will, in any great maritime struggle, whenever this country comes to fight for national existence, the Sovereign must have the aid on the seas of every man who has a sea leg or a sea stomach; and every such man should be made competent to give a capable response to the signal, "England expects every man to do his duty." If Captain Wilson will, during the further time he may be on half-pay—though I do not wish him to be on half-pay longer than he himself wishes,—devote his talents and studies to elaborating a system such as he has himself sketched, widening his views so as to bring the whole control of the personnel of the mercantile marine into the hands of the Government in some form or other—if he would devote his intellect and his labours to the elaboration of that great subject, it would be a work worthy of his great talents,

of his energy, and of his patriotism, and one that would confer great benefit upon the country.

Rear-Admiral J. H. SELWYN: I could have wished, Sir, to have heard some one on the other side of the question who might have informed us more of the mercantile feeling on the subject. I think Captain Wilson's paper mainly brings before us the question, "Which are the best seamen for the Navy, and how can they be obtained?" and I think I see a latent idea in his mind, that it would be most desirable to have our men trained from boys in the duties which they are to perform afterwards; that is to say, thoroughly educated in the true sense of the term, which means, a preparation for the life a person is likely to lead, and not a mere teaching in any formal subjects which he may or may not follow up afterwards. A seaman should be educated in those things which he may be required to do at sea during war or peace, and in such habits as can only be inculcated when they are begun from the earliest days of his life. Afterwards, it is not so much how long it takes you to teach, or what you can teach, but it is what you can make the men unlearn—idle, dirty habits, habits of talking when he should be silent, grumbling, and all those things which unfortunately are too rife to-day in the undisciplined services, are much harder to unlearn than the good is hard to be taught. Therefore, I do think, if it were not for the objection which Captain Wilson has stated, that the number of our ships is not sufficient to employ more than a very small proportion of the boys we now train, he would believe, as I do, the best way would be to train the whole number we require. Captain Dawson has shown that such men so trained would be much more valuable to the mercantile marine than any one we can ever expect to receive from them would be to us. They would be men of such orderly habits as every good shipowner desires to see in his ship; they would be less liable to the seductions of the harbour and of crimps; they would be less likely to deceive their owners, and mutiny against their masters, in proportion as you gave them better training. Many years ago I drew attention strongly to the fact that, in France, the *Inscription Maritime*, together with the law that no person should command a ship above a certain size in their mercantile marine without having served a certain period of his youth in the Navy, had had good effects, and might be very well imitated, if it were not for that popular cry which tells us that the British nation would never stand it. Now I deny that that cry, in any case in which it is uttered, is a wise or a true cry. I shall take exception to the maxim with which Captain Wilson concluded his paper—"Vox populi, vox Dei." I should translate that in exactly the opposite direction. My own experience in America, as well as everywhere else, would teach me, if history did not, that it is precisely *not* what is the voice of God which is the voice of the people. I have been a great deal lately in the "Model Republic," and I can only tell you that they do not believe in it. There is another point which is the inducement to be offered to those boys who become men after we have trained them, the inducement to those men to remain with us. There is a very simple and very effectual means of doing that, one which cannot be too strongly insisted on, as it is the only fair and just way, which will not burden the country too much, and it is, to give to those men who serve their country during a long period of their lives, the fair share of public employment which they ought to have, as a refuge for old age. A man is not the worse, he is very much the better, in a public office for having been trained and disciplined at sea or in the Army. And I would say that, on this question of the Navy, the promotion of persons who have not served the ordinary time, which alone qualifies for such promotion in the service to which he is supposed to be added, is a fallacy and a mistake. You may lower the rank, but you cannot raise the men. You may call people, as they do in America, Majors, Generals, and every other grade you please, by the dozen; what is the result? You simply lower the whole title until nobody cares to bear it. That rank which the Navy and the Army is supposed to give, is almost the only inducement to an Officer and a gentleman to remain in the Service, for the pay, certainly, would never do it. If you lower the rank, you lower the inducement to good men to enter or remain in either Service. I have now arrived at an age and rank when all these things do not affect me personally in the slightest degree, therefore I can scarcely be suspected of having a private interest in the subject, but that will be the inevitable result of going forward with any such

shams as the whole nation has been for the last twenty years past pursuing. And besides this, little by little we are induced to pay twice as much for a sham as we need to pay for the real thing. The Reserve was held out a great many years ago as the great means for allying the merchant marine with the Navy. Now we are told it is not so, and that it has operated positively in the opposite direction. There is an old friend of mine here who has been long a distinguished member of the Naval Reserve, and I think he will say that there never has been a feeling in the mercantile marine against the Navy. They have always worked together as brothers whenever they have met; but, very naturally, a man who has been brought up in the comparative comfort of a man-of-war—the elegancies of life, I may almost say, on board a modern man-of-war—is not prepared to engage later in life in the rough work of the mercantile marine, and you cannot persuade him to do it. Neither can you make use immediately in war of the mercantile marine at your disposal. The enactments within the last twenty years have led to a most lamentable state of things with regard to the flag. You saw in America, the instant war broke out, one or two fast cruisers were not only able to distress and harass the commerce of that nation, but so to raise the insurance, that practically no goods could pass under that flag. So in the French and German war, the German marine was laid up in port, our harbours were crowded with their steamers; I saw them in Rio Janeiro at the same time. The result was, the whole commerce deserted the flag, left those ships and sailors unemployed, and went to another nation. Each nation must now be prepared for that state of things the instant it goes to war; that flag will cease to carry commerce under it at all, because it cannot do so cheaply with war risk for insurance. (Captain WILSON: The men will go with it.) They would perhaps go into the American Marine. Now, as to the steamers; your fast steamers could be made use of in war as the only ones that can really keep the sea, because they carry ten days' full steam (I should be very glad to see a man-of-war carrying ten days' full steam) they can go fast and far and they can carry heavy guns.

The CHAIRMAN: How long would it take to fit a heavy gun in one of those ships?

Admiral SELWYN: There is not the smallest difficulty; they could carry an 80-ton gun to-morrow if you wish, provided you carry it low enough, provided you will consent to have the proper carriages to utilise recoil to carry the guns low down and only bring them up when required to fire, I mean Major Moncrieff's plan. The pensions for public service have always been a very onerous and disagreeable payment for the nation to make. Men live too long as pensioners, those who pay do not like it and murmur at it constantly, but I do think ordinary pay in such public offices as I have suggested, or in such employment, if it was not in public offices yet obtained by the recommendation of the Department, as might fitly be given, would operate as the strongest inducement to good and lasting service. Why did Captain Wilson's friend of the Reserve refuse to serve any longer in the Navy at the age of 30? Simply because he saw no issue. If he had been told, "If you complete your service in the Navy, you will have a good claim on the Government for a certain pension or reward which will take the shape of an office in which you can serve," I think his objections would have vanished. But, unmistakably, we can and ought to train, if we look at it merely as a question of public policy, and to educate the vagabonds in our streets to be something better than the sons of crime they now become. It is now allowed that the training given, even in private ships, is far better than that given by the schools and is not nearly so expensive. I think, under these circumstances, we may claim that there should be first the clear and plain recognition of the fact that the training school of the Navy is not only to be sufficient for itself but also for the mercantile marine, and that if ships of the Navy are not forthcoming in which to continue training our men afterwards, there ought to be a wise expenditure during peace for that object in order to be prepared for war.

Captain BEDFORD PIM, R.N., M.P.: How many men do you estimate are serving in the mercantile marine?

Captain WILSON: I can only go from documents I see printed. I estimate there are about 210,000 *seamen* (but not necessarily *sailors*) but from what I have read

of the evidence given before different committees, and also in the papers, as well as from my own observation, I do not suppose we have more than from 20,000 to 25,000 thoroughly competent *English* able seamen in the mercantile marine.¹

Mr. STIRLING LACON: A calculation put out from Liverpool to-day, states that there are 202,000 men in the mercantile marine, and they bring down their calculation of able seamen to the figures you now mention, somewhere about 30,000.

Captain DAWSON: It does not include foreigners.

Mr. STIRLING LACON: After deducting foreigners. There is one subject I wish to mention to Captain Wilson, and that is the question of apprentices, for it is quite evident that we are coming round to it; and if we do so, it will render the question very feasible in dealing with the Merchant Service and the Navy. Foreigners are obliged to bring up their own boys in order that they may have sailors, and why should not we? but in this great maritime country for the last twenty-five years, the boys have not been able to get to sea. It is only marvellous to me that we have as many as 30,000 sailors in the Merchant Service, but they are gradually falling off. You cannot have sailors unless you begin with them when boys. From returns which I quoted five or six years ago, 60 per cent. of the shipowners of this country were in favour of returning to the old apprentice system; and I am told to-day by the Chairman of Lloyd's Committee, that the mercantile marine are now all but unanimous in favour of a return thereto: but it must be compulsory; unless it is dealt with by the Government as compulsory it is useless, what is obligatory on all is a hardship to none. Ships in which it may not be convenient to take boys should contribute an equivalent in money. If the mercantile marine are in favour of returning to the old apprenticeship system, which I am told is the case, it simplifies matters very much, if the Government will take the matter in hand, and deal with it in a comprehensive spirit.

Captain BEDFORD PIM: You estimate 30,000 as the number of pure blue jackets in the mercantile marine?

Captain WILSON: Might I be allowed to read an extract from a letter which appeared in the *Times*, of Friday, the 14th instant, written by Mr. John Williamson, Honorary Secretary of the Committee of Inquiry into the condition of our merchant seamen. He says, "The total number of hands employed, according to the Registrar-General of Seamen's Returns, is about 202,000; but an analysis will show about the following *bond fide* seamen of all sorts, including apprentices and foreigners, 153,000; but of this number the genuine A.B.'s, including foreigners, are about 40,000. This amount is arrived at from the almost universal testimony of ship masters, that not more than one-fourth of their fore-castle hands know the ordinary duties of a seaman. Deduct foreigners, 20,000; leaves British able-bodied seamen 20,000; and as nearly all the foreigners are able-bodied seamen, the proportion of the best, or able-bodied seamen in our fore-castle, is one-half foreign, and one-half British. These are startling figures to ponder in view of a war with a Naval Power; the foreigners would undoubtedly return to their native country; our Navy would require its Reserves out of the above able-bodied seamen, the carrying trade would be placed in a serious position. So the sooner something be done in the way of 'inaugurating an extensive national system' of training seamen, and that in connection with the Royal Navy, the better for both the material and national interests of our Empire."

That, I think is a very important paragraph.²

¹ Experience shows that only about one man in four is a *skilled able seaman*; we may therefore conclude, that out of the 210,000 or 220,000 seamen, not more than 55,000 are really qualified sailors; but of these we may reckon that from 20,000 to 25,000 are foreigners, for unless they were good seamen they would not be employed in preference to Englishmen; the number must again be reduced by some 6,000 or 8,000 negroes, before we come to the total of *English* skilled sailors, who do not, I believe, exceed 25,000 in all!—J. C. W.

² If the above be true and the Registrar-General's evidence goes to confirm it, our shipping interest should take it to heart and observe how it will affect them in war. In war, out of the 20,000 skilled native seamen, 16,000 the very cream of them, are

Captain R. A. E. SCOTT, R.N. : I should like to make one or two remarks with respect to Captain Wilson's valuable paper, and first as to the means of obtaining men at the present time. I think, from what he says himself, it is very clear that what we must look for, is the training of more boys for the Navy. There is a further point that has not been touched upon, nor will Captain Wilson perhaps do so, but having been very much connected with this part of the Service, I would remark that except men are trained when boys, I do not think that they ever will become thorough gunners. As for the great mass of men at sea at the present time, to call them "gunners," is absurd. They are badly drilled, they are unable to take true aim, and hence they miss when they ought to hit the mark; I am speaking now as an old seaman gunner, formerly of the "Excellent," and I affirm that what we require for boys is early and intelligent training, teaching them the reasons why and wherefore, and giving them to thoroughly understand the machinery with which the guns are being worked, because all these later ponderous guns *must* be worked by machinery; then, whether they go into the Navy or into the Merchant Service, such boys would have an interest in the guns, for we know how fond all boys are of mechanism. Unfortunately our present system of drill, whether in the Royal or in the Mercantile Navy, does not teach the boys the use of machinery, and does not aim at teaching machinery to men, until they are too old to learn, but if we at once adopt a wise national system of training for boys, we shall be in a far better position in case of war. What Admiral Selwyn has said is quite correct as to the ease with which very heavy guns may be mounted in merchant ships, and steam tugs also would be found very valuable for coast defence, supplementing torpedoes with very considerable efficiency. I feel strongly that in order to maintain our naval supremacy we must have more boys. We have boys in our principal towns, who are now learning mischief and going into evil, who could instead be very usefully employed; they would soon get a liking for the Navy and would also be valuable for the Merchant Service, and such boys could be utilised in time of war after being trained to the sea and to the use of machinery; for whatever their subsequent occupations were, we should be able to put our hands upon them: in fact a war would at once bring them to the Navy. It is not sailors only that are wanted in war time, but we should rather want men who can use the latest improved weapons thoroughly. We ought, therefore, to hold out much more encouragement than we do at present. A first-class Petty Officer now fires the guns on board ship. In the "Inflexible," where there are only four guns; fancy a man with 30*l.* or 40*l.* a-year firing these guns—firing away more than his annual income at each round! We ought at once to give a much higher salary, and secure specially trained marksmen and skilled Officers to uphold the honour of the country, or else we may find ourselves distanced by some of our friends over the water whose discipline is better than our own, and whose intelligent training is superior to ours at the present time.

Mr. STIRLING LACON: Captain Wilson spoke of naval barracks, I may mention that I have been round France at L'Orient and at Brest, and I was quite astonished at what I saw in their naval barracks there. They drill the men at single stick, and gymnastics, and the use of weapons, but we have nothing of that kind at present.

Mr. BULLIVANT: I wish to speak upon one point in Captain Wilson's lecture, and that was that he rather disparaged the training that is given in our private training ships as compared with that of the Navy. I do so as having taken a great interest in these ships, being one of the Committee of the "Chichester" and the "Arethusa," and having started the "Worcester," and since acted as Honorary Secretary to the "Worcester," though I do not wish to make any remarks applying to the "Worcester" (which is more of a floating training college for gentlemen's sons, and does not come under the same category as what are usually meant by training ships) but more particularly to the poor boy ships. The age at which the

to be withdrawn from the Navy, leaving hardly any to manage their trade which must either be placed in inefficient hands, or under neutral flags, or laid up, or in the hands of foreign seamen, who may be bribed to carry their valuable vessels into an enemy's port.—J. C. W.

boys are taken into the naval ships is 15½ to 16; the age at which we are obliged to take the poor destitute boys is very often 12, 13, or 14; therefore, I hardly think the comparison is fair when you take the boy's time out of one ship where they commence training at 15½, and then compare it with those we have commenced to train at 13½ and 14. With respect to the training of boys, I can only say that there is not the slightest difficulty. We only want in our training ships funds found us; we are training boys in those ships at the cost of about 22½ a-year. There is not the slightest difficulty in getting them, and the way in which they turn out is most satisfactory. Taking these boys off the streets of London, we find that about 75 per cent. turn out really thoroughly good boys, and as to the system of training, I could give instances in which boys, after having been at sea six years, trained in these ships, are now serving as chief Officers of ships. Therefore, I do not think the training that we give on board these private training ships can be at all disparaged, or that I can grant that the training given in the Navy is better than we are giving in our private training ships.

Captain DENT, R.N. : There is one point I think very necessary to be mentioned when asking for the mercantile marine as a backbone, and that is, for the Navy to consider whether it is capable of being so, as it was in former years; and I say unhesitatingly it is not so. I know, from observation of seafaring people that are going through or detained in the refuge port of Holyhead, and from a very large experience at Liverpool, that whereas, twenty-five years ago, a Captain with fourteen men thought himself unlucky if he had two men who were not able seamen, he now thinks himself very lucky if he has two able seamen in the same number; and the great problem shipowners want to solve now, is how to be able to get good men. As to the question of apprentices, there is very great difficulty, for this reason: Many of the great companies, if they would be perfectly willing to take apprentices, could not train them. In the line I am conducting, I must take a ready-made seaman. I cannot make them. A boy comes in, I can teach him nothing. I should be willing to subscribe for training ships, but I could not take compulsory apprentices, because I could not make sailors of them, our vessels being full-powered steamers, with only pole masts. There is another point I have noticed very much with regard to the Navy and the mercantile marine, viz., whenever they are thrown into contact together, true sailors, whether seamen of the mercantile marine or of the Royal Navy, are always drawn together and always work well together. But, as at present constituted, the Navy are under one department and the mercantile marine under another, and there is a good deal of jealousy between these departments which tends to keep these people apart, and you find it is very difficult even for naval Officers who would like to find employment in the merchant service to get such employment. If they were all thrown under one head that might be done away with. There are a large number of appointments under the Board of Trade filled with people picked up in highways and byways which might be filled very advantageously by naval Officers. There is something to be learned on both sides of the question, that is to say, speaking generally, the Navy knows as little about the Merchant Service as that service knows about the Navy. But I say unhesitatingly at the present moment, under the present régime, with the Merchant Service under one authority and the Navy under another, the tendency of the departments is to keep them apart instead of to amalgamate them. I have got in my own employ a great many seamen from the Royal Navy who are pensioners, and are very good men. They are the backbone of the Service when once they have got thoroughly settled down into it. But there is one thing which has been said to-night more than once, and which is perfectly true, viz., that in the present state of things in the Navy, a man-of-war's man is so very well cared for, that it is not until he has been on shore a little time that he will undergo the hard work in the Merchant Service. Those men have to work very much harder, and really when it comes to the question of pay, if a man gets a pension there is not so very much difference between the Merchant Service and the man-of-war after all in pay, that is putting the Navy pension against the sum a merchant sailor would have to put by to secure a similar provision. I have many men-of-war's men who consider they were far better off on a man-of-war than in the Merchant Service, and had more money to spend.

The CHAIRMAN: I see a gallant member of Parliament, who brought forward a very important Bill last year; I hope he will give us the benefit of his experience to-night. I allude to Captain Pim.

Captain BEDFORD PIM, R.N., M.P.: I certainly brought forward a Bill, and I believe a very important one last year. I shall bring it forward again this year, and I hope and trust it will be the means of giving us plenty of seamen in a few years. At the present moment I am afraid Captain Wilson's scheme is practically useless, because we have no merchant seamen to enter the Naval Reserve at all. He himself remarks that he was told every really good merchant seaman was now in the Reserve; how, therefore, can he hope to get any more? From that source they are all gone, and, as far as my experience of merchant seamen, as seamen goes, and I have seen a good deal of them, they are a very different class of men to what they were, besides you have so many foreigners in the mercantile marine. I have seen ships coming down the river with certainly 75 per cent. of the crew foreigners, and in a return I moved for last year it was shown that there were no less than 1,700 foreigners, captains, mates, engineers of English merchant ships, who are going about the world under the British Flag at this moment. Nearly 1,000 foreigners in command of our merchant ships; there is something rotten in that I think. Of course in the event of war we know what would become of those ships, and we can form a very shrewd idea where those ships would go to.

With regard to obtaining men, my Bill proposes that the scheme of the industrial school at Feltham should be extended to every single county in the kingdom, but for boys who had not come under the law. At Feltham we turn out 100 excellent boys every year and send them to the mercantile marine. If we could have such a school in every county in the kingdom, and from the vast number of letters I received from all parts of the country I believe the counties would be very glad to form such schools, we could train every year something like 10,000 boys at least. I am sure this meeting will be horrified to hear that in England and Wales alone there are no less than 100,000 pauper boys at this moment under 16 years of age likely through life to be a burden on the rates, and yet these boys can be made admirable seamen. Judging by our experience, Captain Dawson knows the Rev. Mr. Scarth in my borough at Gravesend, he or one of his curates boards every ship passing through the port at Gravesend, and he says he can put his finger upon every Feltham boy at once as very far superior to the boy from any training ship. By our return 90 per cent. of these boys now in the Merchant Service are doing very well. If we could extend that system through every county in the kingdom, and I believe they would gladly do so, we could turn out more than sufficient boys to supply both the Navy and the mercantile marine. Another thing which, perhaps, gentlemen in this room are not aware of is, that the waste of men in the mercantile marine per annum is 16,000, and this year we have had more collisions and wrecks, in spite of Mr. Plimsoll, and last year's legislation than ever before, for up to the end of September 1,973 ships made up the list of casualties. It is something horrible when you think of it.

Then as Captain Wilson has pointed out, the seamen are really so very bad, they are put on board more than half drunk at Gravesend, and they just know one end of the ship from the other and that is all. If a captain can get a couple of real A.B.'s with him he is very grateful. I did not intend to address the meeting, but with you, sir, rests the blame for calling upon me.

Mr. STERLING LACON: Is the support of those schools to be a charge on the county rate?

Captain PIM: Entirely. Our Feltham school is supported by a county rate in Middlesex, and I want to see every other county doing its duty in the same manner.

Admiral SELWYN: May I ask Captain Wilson whether he thinks that there is any objection to the apprentices being taken by way of a reward rather from those who are trained in the training ships?

Captain WILSON: I think I show pretty clearly when apprentices are carried, if you go back to the apprentice system, there is no use talking about training ships at all.

Admiral SELWYN: They object to take apprentices unless they are trained.

Captain WILSON: The objection is that they won't take a boy unless he is physically fit to do a man's work, unless he is a good stout ordinary seaman. I say if they won't carry boys voluntarily, pay a fee and let them be trained at sea. I do not approve of sea-going training ships at all so long as you have the real thing itself. If you can send a boy to sea to make a passage to Australia or India, in a sailing vessel or an auxiliary screw, he will learn more in that voyage than he would in ten times the time by reefing topsails in a calm for exercise in a training vessel. I found, when out with the brigs, if I got one good stiff breeze of wind, if I had once to take down a couple of reefs in the topsails, it was a bit of a struggle sometimes with the boys, but after having done so the work went as light as a feather, once having to do a thing from necessity is worth all your reefing topsails inside the Plymouth breakwater. A stationary training ship is a good thing and you teach your boy all he can learn except by experience there. Whenever he has arrived at that stage that he is fit to go to sea in a sea-going training ship, send him away to sea in a merchant ship. It is better to pay his fee and let him go through the whole thing itself than any imitation of it. That is my idea. In the Navy we are obliged to have training ships simply because we have not the ships at sea to send them into. We have always 1,500 to 1,800 boys waiting for ships, therefore we must have training brigs to put them through instead; if you had the vessels in the fleet they would go direct from the stationary training ship to the fleet.

Captain FITZ ROY, R.N.: (In answer to the call of the Chairman) said, as you have called me on my legs, I should like to ask Captain Wilson if he read a letter from a well-known shipowner in the *Times* a few days ago, John Burns of Glasgow. It appears to me everything he stated in that letter, except perhaps some of the financial questions, meets the case as nearly as possible. It is a great national subject, and if it is a national subject it ought to be a national question and a national system of training for the use both of the Merchant Service and the Navy.

Mr. BULLIVANT: There is just one fact I should like to mention. The apprenticeship system is certainly now very much more on the increase than it has been for some time.

The CHAIRMAN: I did not know it existed at present.

Mr. BULLIVANT: Oh, yes! I may say three-fourths or seven-eighths of our boys on the "Worcester," leave and go as apprentices.

Admiral Sir FREDERICK NICOLSON: They are trained for Officers.

The CHAIRMAN: There are no legal apprentices at sea.

Mr. BULLIVANT: They go as legal apprentices.

Captain PIM: There are certain firms that never send a ship to sea without apprentices.

Mr. BULLIVANT: A very small proportion of our boys go as midshipmen; they go as apprentices and are bound for three years as apprentices to the sea with indentures. There is not the slightest difficulty as far as our other boys are concerned.

Captain DAWSON: Without paying premiums?

Mr. BULLIVANT: They pay premiums too, but still they are bound as apprentices to the sea and have indentures in the ordinary way. And there is this advantage in it, a boy if he goes as an apprentice to sea, all his time counts, that is to say, he goes to sea for six months and is on shore three months, and if he is apprenticed all that time counts. They pass after three years' service at sea instead of four as second mates, but if they were not bound as apprentices, all the time they are on shore does not count, it is merely actual sea time, so that it is a great advantage to the boys going as apprentices and not as midshipmen. Many of our destitute boys would only be too happy to go as apprentices, but the fact is they cannot afford it, they have no fund to fall back upon at home. If by any system our destitute boys could be supported when on shore, they would far rather serve their time as apprentices than be changed from ship to ship.

Captain WILSON was then called upon to reply. He said: Captain Dawson began by touching on half-pay, and was good enough, in passing, to pay me a compliment which I the more appreciate, coming as it does from such a very intelligent as man himself, especially on a subject on which he has written so ably. I sus-

pected that if Captain Dawson was here he would touch on the question of half-pay, as I know his views on the subject. At the same time, though apparently there is some difference of opinion between us, I think there is in fact none. I quite admit that a term on shore for a naval Officer is a first-rate thing—we become civilised, rub off the whitewash and coal tar—we mix with people on shore, have our minds expanded, and we get a little polish put on us of which we had little before. I know myself from the time I went to sea at 12 years of age, till I was a post captain, I was but three months on shore, the whole of the rest of that time was served on foreign stations; therefore, not having been on shore, I did not know much of the manners and customs of people we have to mix with. But half-pay does not remedy the evil. Half-pay naval Officers are as a rule poor, our young fellows are thrown on shore as lieutenants, as young commanders, and even as captains on their half-pay, which is too small to allow them to mix on equal terms with those amongst whom they were born, and they are placed at such a disadvantage that instead of being able to go and associate with their friends, live in country houses, stay with this person and shoot with that, and thus acquire the manners and the really important part of an English gentleman's education; they are unable even to visit our own or foreign dockyards, or to go to a foreign country to study a language, or indeed do anything towards improving themselves, but are obliged to be satisfied, unless their friends choose to keep them, with hiding themselves in a garret, and spending all their time and thought in contriving how they can make five shillings go as far as ten. That is the objection I have to half-pay, and you may say what you like, if you gave Officers a certain amount of full-pay time on shore, the country and the Service would benefit by it. Do away with half-pay, but I do not say do away with shore service. Therefore, I do not think we differ very much though we differ on the question of half-pay.

Captain Dawson also said I only touched on the fringe of the subject, that I am aware of. The subject of manning the Navy, when you come to think what it involves, the number of kindred subjects:—Reserves, training ships, supply of men and boys, merchant service, &c.—it really is so boundless that it could not possibly put it into a paper, at least I could not even if I had the brains to do so. I therefore, simply wrote this paper and the one that preceded it as a skeleton, to which I hoped the discussion would add the flesh and muscle; I only pretend to throw out certain suggestions for my brother Officers to discuss.

The number of men for some years considered by Parliament as absolutely necessary to be kept up for the Navy is something between 18,000 and 19,000. As we are only keeping enough ships at sea to carry from 10,000 to 11,000 out of that 19,000, it comes to this, that a man, instead of having a fair amount of sea-service, has very little indeed. Every man-of-war's man has two phases: when you divide him he is a sailor first and then a fighting man, the two qualifications making the man-of-war's man. I hold that you must make him a sailor somehow. The best way of doing so for our purposes is to put him in a man-of-war on a foreign station and he will in three years become a very fair sailor; to finish him off, I would put him into barracks. But when you cannot get that sea training, I say of men that have had some sea training, however rough it has been; give me a young sailor of 23 or 24; he has faced all the contingencies of sea life, he knows what it is to reef a topsail on a dark night, how to furl a topgallant sail, he knows what calm is and how to be calm in an emergency, he has confidence in himself; all these qualities are developed in the man by the work he has to do at sea, are the really important elements in a sailor's character. I do not care how rough he is, how wanting he is in discipline, give me that man, and I cannot, for the life of me, see why in barracks he should not be made into as good a gunner and as good a man-of-war's man as a marine artillery man; why a man who has been five years at sea should not be made as good a fighting man as a marine artillery man, who has been made out of a plough boy in a year, I cannot understand. Of course, the number of men we require when it comes to war, is a question beyond my paper. On a former occasion it was estimated, I think, that we had somewhere about 74,000 seamen, on paper; that number we never could find in the first three months of a war. The men we have to depend on are our 3,500 coast-guard men—I am speaking only of sailors; add to these a couple of thousand

naval pensioners, making 5,500; and as we see by the evidence given before committee, that we cannot depend, during the first three months of a war, on getting more than 5,000 naval Reserve men, we make the total 10,500, which added to our fleet men gives us under 30,000 blue jackets all told. As the loss upon these men would be at the rate of 5,000 a-year, allowing about 15 per cent. which we find is the average waste in a fleet, the naval Reserve men coming home at the rate of 500 a month, would only be sufficient to keep your number up to the 30,000. Therefore, 30,000 sailors are all the men we could ever expect to have available in case of war for the British Navy.

Sir FREDERICK NICOLSON: As able seamen?

Captain WILSON: I am speaking purely of blue jackets which includes all classes of sailors. As has been observed, every ship which could carry a gun would be commissioned, so the question of the number of ships actually in the Navy is a matter of no importance. Look at the American Navy; vessels of all sorts, sailing vessels not excepted, were pressed into the Service. Therefore, the number of men we should require for these ships would be enormous, and, as has been said, we should hope to take some from the enemy's fleet. I may mention a curious fact, which many of you will remember. During the old war, when one of the Georges went down to Devonport he saw a new dock they had commenced to lengthen, the work on which was stopped. His Majesty asked the superintendent why they did not finish it, and he replied:—"Oh, your Majesty! the fact of the matter is, we have been waiting for instructions, because the French have just launched a new ship, ten feet longer than it was intended to make this dock, and we want to know whether it shall be made long enough to hold her;" and strange to say, she was the first ship that went into that dock. That shows our ancestors looked a-head in these matters.

I wish to dispossess your minds of the idea that I raise any objection to the Naval Reserve; and when it is said I rather contradicted myself, because I spoke highly of the four men with me, it must be remembered I spoke highly of them as *sailors*. Sailors are one thing, and men-of-war's men are another, totally distinct; these men were excellent sailors, and in a short time they became very good men-of-war's men, but they were not so when we took them. They knew something of drill; but all know that the drill even of men-of-war's men is very indifferent. If so, what must it be in the Naval Reserve? their knowledge is very crude indeed. I do not wish to depreciate them, but what I wish to point out is, if we can, with advantage, take 1,500 men who have had an average of four or five years at sea in the Merchant Service, and put them into barracks and turn them into men-of-war's men, the five years' sailing that these men have had would be so much clear gain to the fleet. We must link ourselves more with the Naval Reserve, and let the two (Reserve and continuous Service) run together. Captain Dawson thought I wished to depreciate the Reserve, and said a bird in the hand was worth two in the bush. I particularly say in my paper let the two run together, but let the future men for our Reserve, as far as possible, percolate through the Navy. Let us have our 1,500 men coming in every year; instead of having 1,500 boys bottled up in hulks about the coast, there to ripen into what are called "pure blue jackets," learning nothing but vice, let us have 1,500 young sailors from 19 to 25 brought from sea placed in barracks, trained there, and passed into the fleet. These young fellows would in two or three years return to the Naval Reserve, and by and bye half of it would be composed of such men. You must also remember we lose an enormous amount of training-power in our foreign ships. The papers say our ships on the Pacific stations are only half manned; I never was on a foreign station where my ship was always filled up, therefore, when occasion occurs, why should not we be able to enter Reserve men when they choose to come, and why should not their time count towards a pension? Why should these men if they choose to come to us be out of pocket by it? It seems to me to be wrong; I know it is said the 10*l.* does not keep the men out of the Service, but it certainly tends to do so; if you let Reserve men have some equivalent, if, in the first place, they get the same pay as continuous service men, and a certain amount of time allowed for the period they are with you towards a pension, then they will be willing enough to enter when it suits them, and we have vacancies.

It has been said I wished also to depreciate the private training ships. Mr. Bullivant very naturally misunderstood me. I was simply drawing a comparison between them and the Royal ships, because it has been a custom to compare the expense of the two, and I wished to show that before a committee, a very experienced Officer, when asked by a gentleman who wished to show that the private training ships were as good, and very much cheaper, than the Royal Naval training ships, if 2½ years in a private training ship was equivalent to one in the Royal training ship (that was because the expense was about the same in the two cases). Captain Cuming (then commanding the "Cornwall," and who had also commanded one of the Royal training ships) said that a boy having had a year in the Royal training ship was a better theoretical sailor, and certainly a better practical sailor, in addition to being a gunner. I have gone over some of the private training ships and have no objection to them, excepting that I think they are conducted on wrong principles—I do really; they do an immense amount of good but they are conducted on wrong principles as training ships. If you want these vessels to train sailors, and our gallant friend here has told us, there are 100,000 boys in England available for that purpose, then why, when you have a limited number of ships, should you take a boy of 10 when he is not fit to go to sea till he is 16? Why should you have him there for three, four, or five years uselessly when one year is sufficient? The comparison I wished to draw was, that though in the Navy you pay a larger sum per annum for your boys, you in fact, train them cheaper, you make the sailor lad cheaper per head than in your private training ship, and infinitely better.

MR. BULLIVANT: We never take them at 10.

Captain WILSON: Boys were pointed out to me of 9 years of age. I am putting an extreme case, you have to say "How quickly can we turn out a "sailor boy?" Of course, if you have any amount of money and ships, and it is only a question of charity, then it does not matter whether you take a boy at 10 or 20, but if you have only a certain amount of money to expend on a boy you will train him cheaper and better if you take him at a proper age. The private training ships have instructors drawn exactly from the same class as those in the Navy, the Officers who command them are Officers on half-pay from the Royal Navy, therefore these conditions are alike. Then boys are insufficiently fed to develop the bone and muscle required; a boy in a Royal training ship gets four pounds of food per diem, and you can take more work out of them in one day than you could out of yours in a private training ship in a week. I believe it to be true economy, and you will train boys cheaper if you increase your staff and take them in at an older age and only keep them for one year. Of course, I do not in any way refer to the "Worcester." The "Worcester" is a totally distinct vessel and one that I think is admirably conducted. I have had the pleasure of going on board several times, and was very much struck with the instruction and the style of young Officers brought up there, and it was there the idea entered my mind which I have tried to bring forth here, that these young Officers ought to be passed through the Navy, say for six months, to qualify them for the duties which sometime in war they may have to perform in the fleet. It would also give them a greater interest in the Naval Service than they have at present.

The CHAIRMAN: We have to thank Captain Wilson very much for his valuable paper. I think I have the right to make a few remarks, but at this period of the evening I will be as short as possible. The first point is about Officers on half-pay and there Captain Dawson has rather forestalled me. I quite agree with what he said, I regret of course very much that the half-pay is so small. (Captain Dawson: By the term "half-pay," I really meant employment on shore.) Captain Wilson, to my surprise, suggests reducing the number of Officers in the Navy. I cannot agree with him. I do think, looking to our probable requirements in the event of war, that our active list now is reduced to the very lowest minimum possible. (Sir FREDERICK NICOLSON: The active list, of course?) I really believe that if war broke out to-morrow, we should have to call upon some of my worthy friends whom I now see to-night, who have been forced by circumstances to be placed on the retired list. How, then, Captain Wilson can suggest reducing the number of Officers further, I cannot quite understand. I now turn to

circular ironclads of Russia, or Popoffkas, have quite a different form of section, the bottom of the vessel being an extended plane surface, which is connected with the edge of the deck by a quadrant of a small circle. With this form of section great displacement is obtained on moderate draught of water. The deck of the circular ship is formed in section with such curvature as to give in a ship of 100 feet in diameter a round-up of about four feet. There are two Popoffkas already built, named respectively the "Novgorod," Fig. 1, and the "Admiral Popoff," Fig. 2, of which the following are the dimensions and other particulars:—

	"Novgorod."	"Admiral Popoff."
	Ft. ins.	Ft. ins.
Extreme diameter	101 0	121 0
Diameter of flat bottom	76 0	96 0
Depth in hold at centre, from underside of beam to top of the frames of the double bottom ..	13 9	14 0
Draught of water	Forward ..	12 0
	Aft ..	14 0
	Mean ..	13 0
Height of barbette tower from load water-line ..	12 0	13 3
Diameter of barbette tower, outside	30 0	34 0
Height of upper deck at side, from load water line amidships	1 6	1 6
Displacement, in tons	2,490	3,550
Area of midship section in square feet	1,170	1,416
Engines, nominal horse-power	480	640
Coal supply, in tons	200	250
Propellers, screw, in number	6	6
Complement of Officers and men	110	120
Armament, breech-loading guns :		
Two in number, each weighing, in tons ..	28	40
Smaller guns in unarmoured breastwork ..	—	4
	Ft. ins.	Ft. ins.
Height of armour on side above water	1 6	1 6
Depth of ditto below load water line amidships ..	4 6	4 6
Thickness of armour on sides (including equivalent thickness for the hollow iron girders behind armour)	0 11	1 6
„ Lower strake	0 9	1 4
Ditto on barbette tower	0 11	1 6
Thickness of deck plating	0 2½	0 2½

It is but fair to the distinguished designer of these vessels, carefully to bear in mind that, in so far as the "Novgorod" and "Admiral Popoff" are concerned, they have been designed and built purely for service in shallow waters and near the land. You will all remember that during our great war with Russia in the Black Sea and Crimea, the coasts of the Sea of Azof were ravaged by the small and weak unarmoured vessels of our Navy, and that the defences of Kinburn were destroyed by English and French floating batteries which were protected by armour of only four inches thick. The impunity with

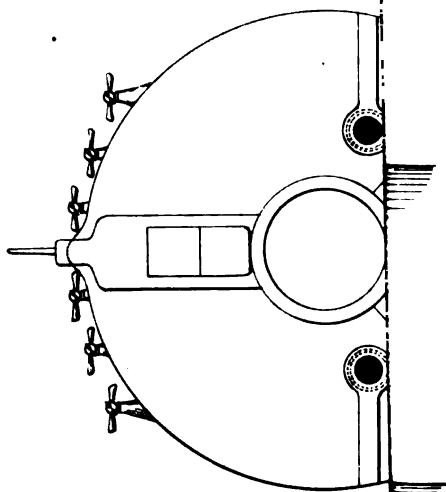
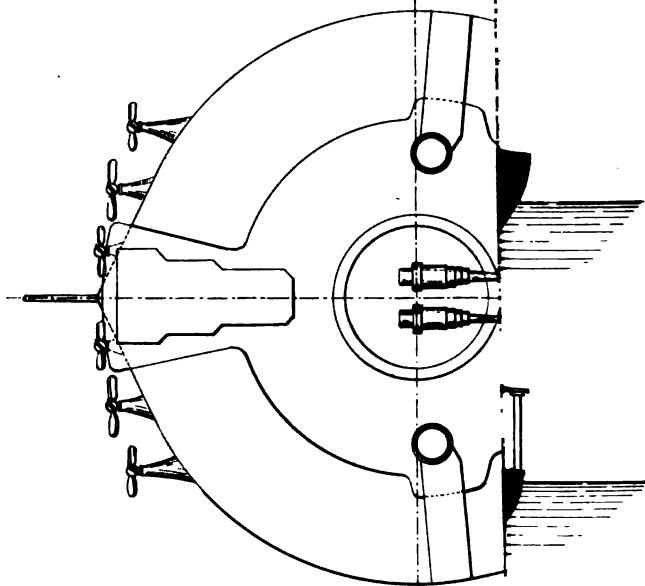


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Plan of Upper Deck B



Plan of Upper Deck

which we thus assailed the Russian coasts on the Azof and at the mouth of the Dnieper, suggested to the Russian Government the necessity of providing sufficiently-armoured floating defences for protection in the future; and whatever we may think of the suitability of the circular vessels for sea-going purposes, we shall all, I presume, agree that in the two ships above described, the Russian Government has put itself into possession of light draught vessels of unexampled power, both offensive and defensive, as compared with the armoured vessels of equally light draught belonging to any and every other country. In this country it must be acknowledged that the problem of producing armour-clad vessels, subject only to the conditions of 13 feet draught, 8 knots speed, thick armour, and heavy guns, has never been put by the administrators of the Navy to the constructors of the Navy. During the seven years that I filled the office of Chief Constructor of the Navy, the only light draught armoured vessels that I was called upon to design were certain very small vessels, the breadth or beam of which was limited to a comparatively small amount, to make them fit for service on the inland waters of North America, and a vessel or two for colonial use, under conditions imposed by colonial requirements. The administrators of the Navy have usually considered—and for my part I have concurred with them—that the necessity for ships capable of performing service abroad is, in our Navy, so much more urgent than that for purely coast-defence vessels, that sea-going qualities at least sufficient to make the ships safe at sea, have been for the most part of primary importance. It is quite open to me, therefore, and to every one, to admit the great qualities of these circular ships, without in any way depreciating our own work as English constructors; and it would be well if those persons who have endeavoured to find in such praise as I have accorded to the circular ships, a condemnation of English vessels, would bear this very important consideration carefully in mind.

With reference to the performance of these circular coast defence ironclads of Russia, I cannot, I fear, do much more than simply repeat what I wrote to *The Times* on the subject. As regards speed, only a low speed was required for the object in view, and with engines of 480 nominal horse-power, manufactured in Russia, a speed of $8\frac{1}{2}$ knots has been obtained in the "Novgorod." She has steamed long distances at an average speed of $7\frac{1}{2}$ knots, and when I was on board we easily averaged over $6\frac{1}{2}$ knots, although the machinery was out of order, and much steam was wasted. I cannot give the indicated power developed, for we had not on board the means of determining it; 2,270 indicated horse-power has subsequently been given to me as the fullest power developed in this vessel. If we consider only the displacement of the vessel, this will no doubt be thought a large power to employ in obtaining a speed of only about 8 knots; but displacement only is a very delusive standard to judge by; the true standard is the offensive and defensive power of the vessel, and I do not believe any other vessel exists, equal to the "Novgorod" in these respects, in which a like speed is obtained with like power. Our

colonial defence vessels of the "Cerberus" class, of my own design, come nearest to the "Novgorod" of any vessels I know, and they certainly steam a knot faster with two-thirds of the power. They also carry 72 tons weight of guns against the "Novgorod's" 56 tons, although this discrepancy is partly compensated in the "Novgorod" by a larger coal supply, after allowing for the increase of fuel required by the larger power. But the "Cerberus" draws 2 feet more water than the "Novgorod," and her defensive powers are not nearly so great as the "Novgorod's," owing to so much of the armour being of less thickness.

With regard to the behaviour of the "Novgorod" at sea, I must say that it was remarkably good. We left the roadstead of Theodosia when a night's gale of wind, blowing across the full extent of the Black Sea from the S.W., had raised a considerable sea, and when a strong breeze was still blowing. The motions of the vessel, both rolling and pitching, were very moderate, never, according to the best measures I could take, reaching as much as 7 degrees. The vertical rise and fall of the centre of the vessel seemed absolutely nil, and the guns could have been fired at any time with excellent aim, and in any direction whatever, excepting only in the line of the funnels, and of the steering deck-house aft. I, who seldom escape some sensation of sickness at sea, felt perfectly at home and comfortable in the "Novgorod" throughout the voyage.

It was impossible to avoid observing how much more efficiently a vessel of this form is protected by her armour than is a vessel of the usual form. In ordinary ships, as you well know, great exposure results from pitching, from rolling, and from the alternation of wave hollows and crests along the ships' sides. No one who has anxiously considered the circumstances of ironclads in an engagement at sea can doubt, I think, that with armour stopping as it has hitherto stopped some five, six, or at the most seven feet under the water—and at much less than these depths at the bow and stern—much of the bottom of the ship below armour is in a sea-way exposed occasionally and repeatedly to the fire of the enemies' guns. From the first day of my connection with ironclad ships I felt the force of this consideration, and fondly hoped to carry the armour continually lower upon the sides of our ironclad frigates as we made progress in other ways. But in a service like the Royal Navy, and where the constructor is but a humble servant of the Admiralty in so many things, I never was able, I think, to get beyond the depth to which the armour of the "Bellerophon" and the "Hercules" was carried, and undoubtedly the length even of our shortest ships occasions so great a demand for armour that it has not been possible, consistently with other conditions which were thought more important, to carry the armour lower than it was carried in the vessels just named. For you will see at a glance that in the case of all vessels where the belt extends from bow to stern an increased depth of armour if uniformly carried means increased depth and weight over the whole length of the vessel. The result is, as I say, that at sea the armour-belt is frequently abandoned by the waves, and the bottom below armour becomes thus subjected to occasional



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and even frequent exposure. I know that this consideration has weighed with many naval officers, and it was greatly urged in the case of the "Devastation" by two Officers with whom I do not at all times agree, viz., Admirals Elliot and Ryder; and some devices were resorted to in that ship and in similar vessels with the sanction of the Admiralty for compensating in some degree for the exposure of the ship at the ends when in a sea-way. It is no doubt true that the largest part of this exposure is at the ends, and is occasioned by the ship pitching, and by the hollowing of the sea between the waves. But rolling also is, of course, a great cause of exposure likewise, and I have considered that in securing great steadiness for modern ironclads in comparison with the early ones, by diminishing the stability (even to the extent of occasionally incurring undue crankness, afterwards compensated by ballast), we have materially mitigated the danger of this kind of exposure. But after all is done that can be done to check rolling, ships will roll at times, and may have to engage enemies when rolling; and if it be true that the circular form of vessel involves less exposure of the hull below water than the ordinary form, there is in that fact a great and valuable element of increased safety (see Figs. 3, 4 and 5). As regards pitching it will be readily admitted, I presume, that ships which are no longer than they are broad, will at the bow and stern be in all probability very much less subjected to exposure of the kind we have considered than ships of the ordinary form. In both respects, therefore, and on the whole, we may confidently expect that circular ships if approximately like the "Novgorod," will be found to expose the bottom of the vessel below armour very much less than ordinary vessels. Certainly the tendency to roll in the Black Sea, when the waves were of ample size to roll an ordinary vessel of her displacement, seemed to me to be singularly small; and as the circular form wherever adopted would no doubt be accompanied, as in the "Novgorod," by low freeboard for at least a considerable part of the vessel's length, all circular vessels will probably always be found to possess great advantages in these respects.

Presuming that all circular armour-clads are to resemble the "Novgorod," we may confidently predict for them a second very important advantage in point of defence. I allude to the fact that in the "Novgorod" and "Admiral Popoff" the armour is of uniform depth and uniform thickness at equal depths throughout the whole extent of the vessel's circumference. Now, in vessels of the ordinary form and proportions there is, and I am afraid always will be, a very grave deficiency in this respect. I believe I may say that every ironclad frigate in existence is characterised by the fact that the armour is greatly reduced in thickness as we pass from the midship portion towards the ends; and in some ships the reduction towards and at the ends is so great that the armour there is little more than nominal. We have been driven, by the length of the ship, to the use of tapering belts—tapering, not only as regards breadth, but much more as regards thickness. Of course, this subject will bear looking at from the other side, and it may be said, with truth, that it has been most wise to give to the engine and boiler spaces and to the magazines a greater measure

of protection than could be allowed to the ends of the vessel, the contents of which were of less vital moment. Still, looking to all the contingencies and risks of a naval engagement, I think every man who takes an ironclad ship into action would be glad to know that his armour tapered neither in breadth nor in thickness, and that a shot or shell fired squarely at him, wherever it might strike, would be equally resisted by his armoured defence. Now, when at sea in the "Novgorod" I felt strongly that this object is attained in her, and I think the simplicity and efficiency of the defensive armour of such a vessel will commend itself strongly to most practical naval Officers.

Those who have thought much of the construction of ironclad ships will have observed that hitherto the decks have been subject to comparative weakness, and that, but for the great comparative height of freeboard which ordinary ships possess, the decks must of necessity have been made a great deal stronger still. Of course, deck attack does not play, and probably never will play, a very important part in naval actions at sea, for obvious reasons; but, even at sea, there are times when weakness of the deck might prove very serious, and whenever ironclad ships are required to attack or to defy land fortresses, they are liable to considerable deck attack from elevated guns. I think I am right in saying that, when a year or two since Admiral Sir Hastings Yelverton was called upon to take by force two Spanish frigates from the harbour of Carthagena, he had to perform that service with the knowledge that there were guns of 12½ tons situated in elevated batteries commanding his decks, and the risk of having to withstand the fire of these guns, as well as of many other powerful ones situated both ashore and afloat, had to be encountered on that occasion—an occasion which, in my humble opinion, is deservedly considered to have elicited from the gallant Officer whom I have named a display of coolness, courage, and determination which effectually proved that we may, with confidence, look in the future, as in the past, to our naval Officers for the full possession of these high qualities. Now, as against deck attack, the "Novgorod" seems very fairly defended, after due allowance is made for the lowness and the upward slope of the deck. In so far as I have investigated the subject, I am also led to believe that on the whole, and speaking generally, the circular ship would have a decided advantage over others, in lending itself to complete armour protection, including that of the deck.

It will be seen from the foregoing that I am strongly disposed to credit circular vessels with great advantages as regards their defensive capabilities against the fire of guns. They possess further advantages, in my opinion, in the facility they afford for protection against the attack of torpedoes. I confess myself much astonished when I found that a gentleman writing to *The Times* declared that this form of vessel was more exposed to the attack of torpedoes than the ordinary form. I cannot see that this is true, even in case of the attack of fixed torpedoes in harbour entrances, or other like places, because the area of the bottom of a circular ship is much smaller than the area of the bottom of an ordinary ship, even when we make allowances for the rise of the bottom of an ordinary ship as the sides and ends are

approached, as compared with the flatness of the bottom of a circular vessel. In making a comparison of this kind we must adopt some standard; I think the standard should be equal power to carry a given weight of battery armour and of protected guns in the vessels compared. Let us, then, take the case of two vessels about equal in this respect, and compare them by simply taking the areas of the load water section in each case. The "Glatton" and "Novgorod" are sufficiently near each other for our purpose, and we find that, while the area of the "Glatton's" water section is about 11,300 square feet, that of the "Novgorod" is about 8,000 square feet, thus showing a difference of 3,300 square feet, or, in other words, the "Glatton's" area of water section is 41 per cent. greater than that of the circular ship. After making due allowance for the greater flatness of the "Novgorod's" bottom, she would still possess the advantage.

But if we pass from the case of ground or anchored torpedoes to the case of moving torpedoes, whether of the Harvey or the Whitehead types, it will be obvious that the circular vessel has much the advantage of the other, as regards liability to be struck. I think we may say that as such attacks will usually be directed to the broadside of the vessel, and will have for their object the destruction of the engine or boiler-room compartments, the relative exposures of the vessels will be approximately as are the areas of their longitudinal sections. Now, taking the two vessels just compared, we find the area of the "Glatton's" longitudinal vertical section, when at the ordinary designed load-draught, is 4,579 square feet, and at the fighting draught, 4,820 square feet, while that of the "Novgorod," at load draught, is about 1,170 square feet. Thus showing a proportion of about 4 to 1 in favour of the circular ship. Without dwelling longer upon the point, I must express my opinion that the advantage is greatly with the circular vessel as regards the chances of escaping the blow of the horizontal torpedo.

But the advantage of the circular vessel does not end here. With such a vessel it is obviously practicable to concentrate your steam power and your magazines at and near the centre of the ship sufficiently to leave around them all a clear space many feet in width, which may be divided and sub-divided into very many compartments so as to limit the extent of the injury when struck by a torpedo, to a degree that is not possible with a long and narrow vessel (see Fig. 6). If Admiral Popoff's system of largely multiplying the propelling engines and screw propellers be adopted, we may say more, for we may isolate each set of engines and boilers from the neighbouring set, and thus largely increase the chances of preserving both the flotation and the propelling power after a torpedo blow had been struck. While on this point, I may admit that I consider for sea-going purposes the arrangement of the screw-propellers, and of the form of the vessel aft, would require to be modified somewhat from the arrangements and form of the "Popoffkas," in order to prevent the screws from protruding largely beyond the circumference of the vessel. As the "Novgorod" and the "Admiral Popoff" are to fight from shallow waters, the projection of their screw propellers is of but little moment,

but in a sea-going ship it would not do to allow the screws so to project that an enemy, by simply steaming past the stern in contact with it, would destroy or injure several of the propellers at once. There will be no difficulty, however, in making the necessary modifications, so that I need not here dwell upon the point. I may conclude my remarks on the defensive powers of circular vessels, by stating that I am unable to see how vessels of the usual form, can, by possibility, be made as secure as circular vessels from the blows of torpedoes and rams, and from the destructive effects of such blows.

It has been confidently stated that circular ships cannot be efficiently steered. That they answer their helm with promptness and certainty is to me, after my experiences in the "Novgorod," absolutely certain. But, in point of fact, the objection is really based on the circumstance, that while in a long ship, when she is turning round under her helm, her length comes athwart her course and takes the momentum out of her; a round ship, as she turns, has no such increased surface to oppose, and will therefore lose momentum less rapidly. This is no doubt perfectly true, but surely it is a matter of extremely small importance, and one entirely unworthy of consideration as a substantial objection to the employment of circular vessels. In every ship the steam power which gives onward momentum to her, is always at hand to take it out of her by the reversal of the engines. This is therefore, merely a question of manœuvring, which our naval Officers are fully capable of solving.

You will expect me to say a few words about the low freeboard of these vessels. In ships of ordinary form and proportion there are many objections to low freeboard, but the chief of these is reduced more and more as the length of the ship is diminished and the breadth increased, and they become of comparatively small importance in circular ships, in which the length is of course very short and the breadth very great. I will here advert only to two of the more serious objections to low freeboard ships of usual form: they would be deficient of stability, and the margin of surplus buoyancy which they would possess would be too small for purposes of safety. A collision, or an accident much less serious than a collision, would suffice to send them quickly to the bottom. More than one of the American "Monitors" were, if I remember rightly, sunk from the mere accident of a hatch in the deck being left open. But with the circular form of ship, and with a greatly rounded deck like the decks of Admiral Popoff's vessels, both these objections are very materially diminished. In fact it is quite possible in a circular ship to adopt a very low freeboard and yet to have, with a well rounded deck, ample security for all purposes, and good surplus buoyancy likewise. For example suppose we take a circular ship of 150 feet in diameter and 12 feet draught, and therefore with a displacement of about 6,000 tons. With 2 feet 6 inches freeboard, and a good round up of the deck, we can have a surplus buoyancy of 3,000 tons. A ship 280 feet long and 54 broad, with about the same displacement (6,000 tons) would have surplus buoyancy of about 300 or 320 tons per foot, and therefore, with the ordinary round up of deck, would require a freeboard of about

9 feet to bring her surplus buoyancy up to an equality with that of the circular vessel with $2\frac{1}{2}$ feet of freeboard. It is hardly necessary to remark upon the relative stabilities of two such vessels, because in either case it would be ample for all the uses to which the circular ship could be put. You will observe, therefore, that the circular form sweeps away some of the gravest objections to low freeboard. With reference to the sea flooding the low upper deck, much less of this takes place than would ordinarily be expected, and I am inclined to believe that the trials of large circular ironclads, even in channel or Atlantic waves, would develop very unexpected and satisfactory features.

In this connection I ought, nevertheless, to make it quite clear that the "Novgorod," and "Admiral Popoff," have, like the "Devastation," very extensive unarmoured houses erected above the armoured deck. The chief of these is a spacious forecastle, which of course adds greatly to the buoyancy forward when the sea rises there upon the vessel, and I do not think even circular vessels of very low freeboard could be steamed against a heavy head sea without such a forecastle, more especially, as we shall see hereafter, when driven at a high speed. The forecastle, and other deckhouses, add very greatly to the accommodation and comfort of a circular ironclad.

In coming now to consider more generally the qualities of circular vessels, and especially of fast sea-going vessels, I think it right to say most distinctly that the great value which I attach to Admiral Popoff's labours in this connection, springs from the stimulus they exert in favour of reduced length and increased breadth in ironclads. The circular ships exhibit the limit of reduced length and increased breadth, and it is in this aspect that I wish to discuss the subject. I do not profess to be able to discuss it at all exhaustively; my investigations have not gone nearly far enough for this, and it is upon investigation only that strong opinions in such a matter as this should be based. To say that circular ships can, or even to suggest that they possibly may, have high speed given to them is a startling thing, for we all know that the resistance of such a form of ship must be very great indeed. We all know that great steam-power must be needed to overcome that resistance. Still, having come to plate our ships with very thick armour, and to carry tremendously heavy concentrated armaments, we have now to ask whether the adoption of ordinary forms and proportions does not entail upon us greater disadvantages than an increase of steam power? In order to place the subject into due relation to the broad question of ironclad construction, I have to ask you to look at it from this new point of view: Hitherto the problem has been, how best to armour-plate ships? The problem to which I now invite your attention is, how best to adapt armour-plated fortresses for being sent to sea, and steaming there at sufficient speed?

This aspect of the subject is for all practical purposes a new one, and one which the progress of events has first made possible and then forced upon us. No doubt many persons—myself among the number—years ago conceived forms of floating fortresses capable of being sent to sea. But in a country like this there are many checks to rapid

progress, and in dealing with a great service like the Navy it is unavoidable that improvement should—

“Slowly broaden down
From precedent to precedent.”

It was most natural, and on the whole I think most proper, that when the use of shell guns drove the Navy to the use of shell-proof armour, the application of such armour to something like existing ships was first resorted to. It must be remembered that steam itself was only introduced into the Navy as an auxiliary to masts and sails; and although it has been continually assuming more and more importance, it is in extremely few vessels only that the use of canvas has been dispensed with. If we may believe what we read in the newspapers, the “Inflexible” herself, with her 2-feet thick armour, her 85-ton guns, and her twin engines of 8,500 horse-power is to be furnished with mast and sails. As she is to carry, however, but 18,000 feet of canvas to 11,000 tons of displacement (or less than one-half the proportion of the “Hercules”), it is clear that the sail has become completely subordinated to the steam in this ship, while from the “Devastation” and some similar ships sail has disappeared altogether. I think we may safely say that when the steam power comes to be distributed over a greater number of engines, so that all danger is removed of the ship becoming disabled by a loss of all her engine-power at once, masts and sails will finally disappear from heavily-armoured vessels. We may believe this the more confidently when we note that Naval Officers themselves, and more especially those who have commanded ironclads, or squadrons of ironclads, now cease to demand the use of sail-power in such ships, and consider that very heavily-armoured vessels should not be allowed in any way to depend upon sail for safety.

With the abandonment of masts and sails in such vessels disappears the necessity of adhering in their construction to the ordinary forms and proportions of ships; and we are now free, as I say, to consider in future what is the best form of battery, citadel, or fortress we can adopt, and what are the best means of sending it to sea under steam. I expect to have the general concurrence of thoughtful officers in saying that with armour already 2 feet thick in the “Inflexible,” and a hull to carry it made larger than any previous ship except the “Great Eastern,” it is time that we ceased to armour mere *ships*, and set about subordinating ship-shapeness and the use of sails to more momentous considerations.

Seven years ago I wrote and published a work on “Our Ironclad Ships,” in the Introduction to which I said:—“Our clear duty for some time to come will be to avoid alike false analogies and speculative forecasts, and to develop as steadily and as rapidly as heretofore the power, both of the gun with which we assail the enemy, and of the armour with which we repel his assaults upon us. As an encouragement to this course, it may perhaps be not amiss to mention that I have myself devised plans for carrying extremely heavy armour, which it has not yet been necessary to divulge, but

"which will come into active play when we have attained to the use of such thicknesses of armour as are now deemed too great for even a moment's consideration by those who think superficially upon this subject."

The basis of that remark was that, I had then foreseen, that as armour increased in thickness and guns in weight, their requirements would more and more overpower the requirements of mere steam and sailing ships, and that ironclad ships would have to be made first and foremost armoured and armed sea citadels. Starting with this idea, and desiring to preserve as many of the qualities of a ship as were consistent with it, I projected at the Admiralty a number of tentative designs on the general principle exhibited in the annexed diagram, Fig. 7, the citadel having sufficient buoyancy and stability to maintain the vessel afloat at her fighting draught, and with the necessary stability, even when the ends were filled with water as shown. By the desire of Lord Dufferin, I explained my views on the subject to the Admiralty Committee of Designs, in April, 1871; and, at the request of the Committee, Mr. Barnaby, the present able Director of Naval Construction, was good enough, at a later period, to furnish certain additional observations on the subject. Between ships of this class, and those subsequently advocated by Admirals Elliot and Ryder, or the "Inflexible" herself, I cannot discern any difference of principle whatever. It has been proposed, I believe, in those cases to place cork, stow coal, &c., in the water spaces, but these are details that do not affect the general principle. It must be understood, however, that beyond claiming to have laid down this general principle of the plan I do not go; the "Inflexible's" design in all other respects being solely due, I believe, to the Construction Staff of the Admiralty.

I have dwelt upon this type of design for a reason which you will now discern. The object in originating it was, as you will see, to build a very strongly armour-plated citadel carrying very heavy guns, and to add as little additional armour as possible to that which the citadel demanded. All the armour I proposed to employ apart from the citadel was, as you will observe, that of an under-water deck 3 or 4 inches thick, and that deck I sought to make very short. Still, in time of battle, the water must be let in at the ends, and that water took the place of a belt of armour of about equal weight, and to that extent the citadel was further encumbered.

Two years after the publication of the book above referred to, I went to Russia, and there I found that Admiral Popoff had designed, and the Imperial Government had ordered to be built, iron-plated vessels of circular form for the defence of the Dnieper and of the Sea of Azof. I saw the keel of the first vessel laid, and during last autumn I had the privilege of inspecting her at Nicholaieff, and of steaming in her from Sevastopol to Theodosia and back to Yalta. I wrote my impressions of the vessel to *The Times*, and as the editor has permitted me to republish my letters, what I there said is now accessible to all.

Now the chief characteristic of these circular ironclads is that they are purely and simply sea-citadels, propelled by steam, and without

any attempt whatever to make them conform to the shape of an ordinary ship.

The question to be determined hereafter is, is this form of vessel, thus originated for coast defence purposes, and proved eminently successful for that purpose, available under proper modifications, for sea-going citadels.

I think we may fairly say that for a sea-citadel, viewed as a citadel only, apart from other features, the circular form is best, because it requires a minimum amount of armour to protect a given area or volume; or, in other words, with a given amount of armour secures the greatest amount of buoyancy. For special purposes some modified form might be preferable, but speaking generally, the circular form is the best for floating armour to protect an included space, and also for giving that equal all-round command with your guns which is so desirable at sea. Starting then with this circular armoured citadel, and wishing to propel it at speed at sea, there are several ways in which we can deal with it.

1. We can put engine-power in it just as it stands, without modification; or,

2. We can build ends to it like those of an ordinary ship, protecting those ends by a belt of armour, as in the "Bellerophon," "Hercules," and many other ships; or,

3. We can build such ends to it, and protect the lower parts of them by an under-water deck of armour, as in the "Inflexible"; or,

4. We can build around it an outer circle of thin iron, with a mere narrow belt of armour, analogous to the belt of ordinary ironclads; or,

5. We can build around it such an outer circle of thin iron, with an under-water deck of armour, analogous to that of the "Inflexible," or

6. We can build short ends to it, with either belts or under-water armour decks, but of greatly reduced length as compared with the ends of ordinary ships of large beam.

The "Novgorod" is the only actual example of the first of these cases that has yet been tried, and we may state roughly that in her, 750 tons of armour, and 56 tons of guns, are carried on a displacement of 2,500 tons, and driven at about $8\frac{1}{2}$ knots with 2,270 indicated horse-power. This confirms what we already knew, viz., that such ships will require great power in proportion to displacement. But taking not the false standard of displacement, but the better (although not perfect) standard of weight of armour and guns as our guide, we shall find nothing very extraordinary in the power required. In the "Warrior," our first ironclad, the armour and the guns protected by it weighed 1,100 tons, and 5,470 indicated horse-power was required to propel it. In our next ironclad, the "Defence," the armour and protected guns weighed about 700 tons, and the indicated horse-power employed at full speed was 2,500. Grouping these figures we have—

	"Novgorod."	"Warrior."	"Defence."
Weight of armour and of guns protected	806 tons	1,100 tons	700 tons
Indicated horse-power at full speed ..	2,270	5,470	2,500
Proportion of power to weight driven ..	2·8 to 1	4·9 to 1	3·5 to 1

It will of course be said that the "Warrior" was driven at 14 knots, and the "Defence" at nearly 12, "while the "Novgorod's" speed was only 8½. But on the other hand, not only was the steam power required in the "Warrior" so much greater as we see, but even with this power an enormously long and costly vessel was constructed solely with the object of promoting speed; and when speed was by these means attained, we still had a ship with only about one-half of her protected, with exposed steering apparatus, and with other very serious defects as a fighting engine. In the "Defence" analogous sacrifices were made, but on a length proportioned, of course, to the reduced speed.

If we take a fully armoured ship, say the "Prince Consort," for comparison, we shall have the following figures—

	"Novgorod."	"Prince Consort."
Weight of armour and guns protected ..	806 tons	1,080 tons.
Indicated horse-power at full speed ..	2,270	4,234
Proportion of power to weight driven ..	2·8 to 1	3·9 to 1

Here the vessel was fully armoured, but the armour was thin, and could be extended over the whole length of a hull of pretty bluff form of moderate length. But as armour progressed in thickness, to extend it over the whole length would have been to increase greatly the size, power, and cost of the ship, and therefore we were obliged to resort to central batteries or citadels, the water-line armour alone extending from stem to stern. This of course involved a still greater proportion of power to weight of citadel and guns, although it enabled us to keep down the size, power, and cost.

We may start, therefore, by saying that the circular ironclads have started with a much less proportion of steam power to citadel armour and guns than has usually been given to ironclads, and not with an enormously greater power as many persons have been too ready to suppose; and I must say that before resorting to the adoption of enormous ends, whether armoured or unarmoured, as a means of fining the lines, it is incumbent upon us to investigate how far it is possible, or otherwise, to get high speed by merely increasing the power. As compared with ordinary forms the power required to drive at high speed a circular ship of equal displacement, will probably be from two to three times that required for an equal displacement obtained on ordinary lines, or even more; but then displacement, as we have seen, is no sufficient basis, and the problem is to find out the true basis, and to proceed upon that.

I feel persuaded that the circular ship or citadel will hereafter be

taken at least as the point of departure, if I may so speak, of our investigations. It is idle to say, as has been said, that it is impossible to put engine-power enough in it to drive it at high speed, because the engine-carrying and coal-carrying power can be enormously increased, while preserving the circular form by the plans suggested in cases 4 and 5 before given. We are just as free to extend our unarmoured hull, or our belt-protected hull, or our under-water-deck-protected hull all round a circular armoured citadel, as we have been to extend our rectangular citadel ships to great length by means of long fine ends protected either as in the "Hercules" or in the "Inflexible;" and I can see many advantages in doing so.

But there is one consideration which strongly tends, in my opinion, to favour the adoption of a short bow and stern in these vessels of extreme breadth, and that is, that the power of the vessel to steam against a head-sea would thereby be improved. This opinion is in some small degree based upon my observations in the "Novgorod," but as her speed is so small, no marked features were in this respect developed. But there are considerations, based upon the relations between wave-periods and a ship's period of longitudinal oscillation, and of the changes in these relations effected by great speed, which point strongly to the value of some elongation of the form especially at the bow in order to facilitate steaming against a head sea at speed. I have had the advantage of a conversation on this subject with that very eminent investigator of naval science, Mr. Froude, and I think I may venture to say that he fully concurs with this view, and attaches to it even more importance than I at first did. The accompanying diagram, Plate III, fig. 8, shows that, with a comparatively small increase of armour, the circle may be developed into an approximately ship-shape form of short length and great breadth.

But knowing as I do much of the mind of Admiral Popoff on this matter, I think I may safely say that he is quite as ready as you or I would be to make any modifications of the circular form which either high speed or any other special object may require. He has, as I have intimated, added even to his coast defence vessels a protrusion from the strict circular form at the stern to assist in housing the rudder-head; and for sea-going ships, he has before now suggested the prolongation of the bow into a ram. He has taken so much pains to assert and reiterate that his great object is to promote economy and efficiency by extreme shortening and broadening of ships, and has achieved, as I believe, so distinguished a success, that although he has taken the circular form as his emblem and battle-flag, so to speak, his great object would be accomplished and his victory won—and mine with his—if the present proportions of heavily-armoured ships were superseded, even though the circular form were stretched to an oval, or made pointed at the bow and stern, or even modelled into something like a ship-shape, provided only that the full benefit of extreme breadth and shortness are secured. It would be presumptuous in me, at the present stage of the inquiry, to assign perfection and finality either to the true circle, or to any one particular modification of purely circular lines. I repeat now, what I said before in *The Times*,

that I believe the circular form is itself quite compatible with high speed, and certainly it possesses very great and numerous advantages in other respects. I do not, however, refuse to bring it under the closest scientific scrutiny; I do not say that some modifications of it may not be beneficial; what I suggest is, that you, and especially those of you who influence the Admiralty, should secure for the whole subject impartial and exhaustive investigation. I am glad to say the Admiralty are having it investigated; on their behalf Mr. Froude is applying his splendid apparatus and his remarkable faculties to the resistance part of the question. But inquiry must not stop there; Mr. Froude himself, and the Construction Staff of the Admiralty, are well qualified to pursue it much further than that, and I hope they will pursue it to the end. I have myself thought the matter out sufficiently to be quite sure that many unexpected advantages will be found to gather around the principle of making even fast sea-going ironclads extremely broad and extremely short.

The CHAIRMAN: We have now had a full description of these vessels, and we find them favoured, if not backed, by the opinion of Mr. Reed, the originator and constructor of that ironclad fleet, of which we are justly proud. Therefore, if any officer or gentleman has anything to say on this subject, I hope he will be good enough to favour us with his observations.

Mr. SCOTT RUSSELL: Mr. Chairman and Gentlemen,—As no one else rises, perhaps I may be permitted to offer an observation or two. It so happens that I was one of the designers of the "Warrior," that I had something to do with the "Great Eastern," and had also to build one of the first so-called ironclad batteries; therefore I may be said to have even a little personal interest in this matter. But I come here to-day merely with the feeling that we are very much obliged to Mr. Reed for having brought this subject so clearly and so thoroughly before us, and for having added his own observations and opinions to those of the inventors of this circular system. Mr. Elder is the gentleman who first developed the great value of circular vessels for steam purposes. He was an old friend of mine, and I was very much struck by the great originality of the system, and by the great wisdom with which Mr. Elder never thought of making it a substitute for ship-shape ships; but merely brought it forward as an instrument for accomplishing certain peculiar ends for which it happened to be peculiarly adapted. For example, he meant it to be, not a substitute for sea-going ships, but to be applied to the purposes of a ferry-boat between Liverpool and Birkenhead; and he showed me that as a ferry-boat he could by this means carry far more in proportion to its mass of weight and given draught of water than by any other form, and also that it could be propelled at slow velocities with moderate power. Let me say one word on that subject, in order to be rid of it once for all. At slow velocities allow me to assure you this circular form is propelled nearly as easily as any other ordinary form, and therefore let us draw a clear distinction between talking of low velocities, like 6 or 7 miles an hour, and high velocities, such as we think necessary for our steam navy—namely, 14 knots an hour. There is no resemblance between them; and this is an admirable shape for one of the purposes, and is totally out of question for the other. With regard to the merits of Admiral Popoff in this matter, allow me to say that I esteem it quite as highly, if not higher, than that of Mr. Elder. Though Mr. Elder may have adopted the circular form, we are indebted to Admiral Popoff for having adopted this circular form and propelled it for the special purpose of naval warfare. Admiral Popoff four or six years ago was kind enough to explain to me all his views on that subject. I entirely coincided with those views, and I think this vessel a very admirable thing, so long as you do not call it a ship. Now this floating battery—for it deserves the name—of a circular form is most admirably adapted for carrying the heaviest armaments and the heaviest armour, and for the special purpose of local defence, for which it was designed. Admiral Popoff is entitled not only to our thanks, but

to our admiration. Permit me to say here confidentially that it so happened that I served professionally on several of the Commissions for Coast Defence. I had the pleasure of sitting there with some of the most distinguished Admirals and Generals whom I see here, and we discussed among other things the whole question of fixed fortresses, of floating fortresses, of self-moving fortresses, of elongated fortresses, and of circular fortresses, and we arrived at a great many conclusions which I dare not tell you here. The question which Admiral Popoff's invention raises is this—"What are the particular places in England where you think that floating batteries are wanted as coast defences?" And if you know of such places, allow me to say that his experiments show that you can make excellent vessels for local defence most economically and most conveniently of the circular form. There is another question which he raises: whether it is more expedient to propel these vessels by power within themselves, or to anchor them where they are wanted, or to shift them by tug vessels from the outside? You will find if you only settle the circumstances in which you want these defences, the circumstances will settle for you which plan is the best. In the one place you will find the fixed circular battery is the best; in another, the anchored circular battery is the best; and in another you will find that vessels conveniently moved by other vessels towing them are the best; and, finally, you will find that there are other circumstances in which it is most desirable, at great sacrifice of cost, of machinery, of complication of construction, and so on, to have steam engines to enable you to transport them from the place where they are stored to the place where they are required.

I come next to the question whether, according to a suggestion made in the paper, you ought to consider the sea-going qualities of a ship of war as qualities of the second or third rank, and whether you should place the armour or the other points in the ship in the foreground, and leave her seaworthy ship-shapeness as a secondary point. On that I will endeavour to say all I think in two or three sentences. In the first place, I call your attention to the fact that in all those qualities and quantities quoted by Mr. Reed with reference to this subject he has left out of sight the real question of a sea-going ship—namely, how long a voyage has it got to make, how much coal has it got to take for that length of voyage, and at what rate is it to steam on that voyage? Now those, allow me to tell you, as sea-going qualities and quantities are elements which, I trust, will rule our future navies, and not the question how the utmost performance can be got out of a short ship of this or that shape. I think it is most unwise to set up any theoretical notions of what the best possible shape is, and it is most necessary that for every ship, when it is about to be constructed, you should take into consideration the practical purposes for which that particular ship is wanted. If you do that, you may get a good ship, and if you are only to have a grand ship in general, without any particular duty, you will get a bad ship. If you settle what the speed of your ship is to be, that will give you the length of the ship—the minimum length. If you settle, secondly, what the depth of water is into which she must go, that settles for you the draught of water of your ship. If you then ask me what settles the breadth, I answer the weights to be carried and the sea-going qualities settle the breadth? You then say, "Having settled the minimum length, what increases the length?" I answer you in a moment, what increases the length is the length of the voyage of the ship. A small quantity of coal in a given ship will certainly let that ship go at a given speed; but it will not maintain the speed, and will not make the voyage. The ship grows in length according to the length of the voyage she has to make; therefore, I say, lay down the conditions of your ship first of all, then make it a principle that above all things she shall be a seaworthy, sea-going ship. Thirdly, make it a condition that she shall have the power of remaining long at sea, and that implies her carrying large stores; and if you will then add the particular nature of the service she has to perform, you will find all the rest will settle itself. The last observation I have to make is an observation practically upon my old pet the "Warrior," and practically on this diagram, which Mr. Reed has given you, of a vessel with a central fortress. You all know the "Warrior" was the first vessel of this class. I think you all rather liked the "Warrior," as a sea-going, sea-worthy ship. I think also you all remember that the "Warrior" had the principle of a central battery, and that that principle of a central battery has been followed, and must be followed. Allow me, however, to differ entirely from

Mr. Reed on a point he has put forward—namely, that you cannot, without this enormous deck which he has given, and this mode which he has given of filling the fore and aft part of the ship with water, make that a good, seaworthy ship. Allow me to say that you can; that there are ample means with a central fortress of having your ship beautifully shaped, perfectly like a seaworthy ship, and with all the qualities you require of speed, stability, and endurance, without making an ugly shape of that kind. If you will permit me to entreat you, it is not to give up your old sea-going prejudices of having a handsome, ship-shape, seaworthy ship. And if you will take my word for it, neither ugly ships, nor ugly proportions, nor any of these things you have lately been used to, which have offended the eye, and have disgusted so many sailors with their profession,—I say, if you will only get rid of such prejudices as these are, you will find that you may to-day have a perfect central fort, have an unsinkable ship, have the best guns and most powerful armour, have a convenient, comfortable, and wholesome dwelling, and still have all the beautiful form and sea-going qualities which you had before. Only you must *first will it*, and then you must give those people to whom you confide its construction *full power* to carry out your purpose in the design and in the execution of the work.

Mr. WILLIAM SMITH, C.E. : I wish to correct an error which Mr. Reed seems to have fallen into. He speaks of this circular shape as being merely a suggestion of the late Mr. John Elder's. Now I think the transactions of this Institution will carry you back to a period when Mr. Elder read a paper here upon the subject of circular ironclads and other vessels, and you will find he referred not simply to the ferry-boats, to which Mr. Scott Russell has alluded, but also to circular turret-ships and floating fortifications, of which he gave a variety of diagrams. There is one point also to which Mr. Reed has given considerable prominence: he says the suggestion of Mr. Elder was, that the mid-ship section of the vessel should in every case be the arc of a circle. That is a very great error; and you have only to refer to the Transactions of this Institution, published some years ago, to find that it is so. In fact, if I look at the diagrams Mr. Reed has placed upon the wall, I see there is little or no difference between them and those which Mr. Elder brought before this Institution. I think it was in 1860 or 1861, during the time the British Association Committee on steam-ship performance were sitting, Mr. Henry Wright, now Secretary to His Grace the Duke of Sutherland, was then preparing a collection of facts and materials sent in from time to time to be recorded in the proceedings of the Association; and at that time Mr. Elder described to Mr. Reed, in my presence, the idea he had in his mind, and I advised him to make a series of experiments, to ascertain the difference of resistance of that particular form which he described. He had a series of models made and experimented with them, and the results were recorded. I think he called upon Mr. Reed, who was not then the Chief Constructor of the Navy, and described his invention to him, accompanying his description by diagrams. And I am sorry to say that Mr. Reed did not at that time so fully appreciate the merits and advantages of the form of vessel then described to him by Mr. Elder as he has since had occasion to do. Under these circumstances, I think it hardly fair to give Admiral Popoff the full credit for this circular design; and that this occasion ought not to pass without my putting on record that Mr. Elder certainly was the first designer of these circular ironclads, not with their mid-ship section, a portion of a sphere, but according to diagrams exactly identical with those which we see before us.

Major-General Sir JOHN ADYE : Although this question is a naval rather than a military one, still I hope you will allow me as an artilleryman to make a few remarks, not upon the general construction of these circular ironclads, but upon the arrangements which have been made for mounting and fighting their guns. According to the description which Mr. Reed has given us, the circular ironclad has in the centre an open-topped fixed turret, that is, an iron martello tower on a floating platform, capable of moving at slow speed. The guns are *en barbette*, with a slight command over the water. Now we all know that the barbette principle affords great lateral range; but the disadvantages are, that it leaves the guns and their detachments fully exposed. These circular ironclads, therefore, if attacked from more points than one at the same time, offer no defence at all to lateral fire. And there is another danger of mounting guns in this way so close to the water, namely,

that they are liable to be commanded, and the guns and men therefore exposed to great danger. On shore we rarely, if ever, contemplate mounting guns *en barbette* near the level of the water, where serious and close action is expected. We rather seek for a high and a somewhat distant position, where the advantages of an all-round, lateral, and plunging fire are available, and where the exposure of the men and the guns is reduced to a minimum. Those are the principles upon which we construct *barbette* batteries on shore, and they do not appear to me to be carried out in the present instance. I am quite aware the reply will be, that you may get greater speed, and you may get the disadvantages of *barbette* remedied by the disappearing principle. It is true; but in the circular ships which have as yet been built that principle has not been adopted; therefore, I presume that the distinguished Officer who designed them did not find his way to mounting guns except *en barbette*. Even if that system were established, you would still have an open-topped turret, and therefore, in my opinion, the guns as now mounted, and their detachments, being fully exposed to flank and plunging fire, are not well adapted for close and serious action.

Commander W. DAWSON, R.N. : In a naval discussion upon circular vessels it does seem very extraordinary that, surrounded as we are by a great number of most experienced naval Officers, the whole discussion of such a nautical subject should be left in the hands of military men and of civil engineers. A great deal that I should have myself said has been anticipated by Mr. Scott Russell, and by what has just fallen from Sir John Adye. We are invited to consider the use of this vessel, not in its local and limited application, but as a sea-keeping ship. One point to which I wish to draw attention as to its sea-keeping qualities is this, that if the ignorant prejudices of naval Officers against a novel construction of this kind are to be met, it must be given a special name, and not be called a "ship." The very first requirement of a ship in a sailor's estimation is, that it should constitute a comfortable home, a permanent habitation, in which he can spend his life from boyhood until he leaves the Service. It is quite true that in these saucer-shaped diving-bells, or whatever you choose to call them, air will be pumped in in very large quantities; but I should recommend those who advocate this vessel as a sea-keeping residence, to ask the manager of the Polytechnic Institution to allow him to go into the diving-bell there for ten minutes. He would find abundance of air pumped in, and perhaps for that length of time he would not suffer inconvenience; but let him stop there a month, and when he has been in a diving-bell for a month, he would get a very fair idea of what a life-long residence in a sea-keeping thing of this kind means. With a very diminutive amount of light, and with air pumped in at high pressure, he will thus be able to judge of the effect which permanently living under water will have upon the spirits as well as upon the health of the fighting men. If it is desired to reconcile sailors to the adoption of a vessel of this kind for sea-keeping purposes, it must be called by some other name than a "ship." Coming to the point of the special use of such a semi-submerged residence as a vessel of war in the Atlantic: This is a point which involves considerations of fleet manœuvres which many naval Officers present are far more capable of discussing than I am, and which ought to be discussed from all sides, if vessels of this class are to be opposed or defended in the open sea. It must be remembered that this broad, exposed, and unprotected deck may be met by high-sided vessels of various classes. What would be the relative positions of the high-sided "Sultan's" and "Hercules" and the low and broad-decked vessel when they meet in hostile conflict? In dealing with such questions, we ought to regard the proposed employment of such a vessel in open water as critics; and therefore I am now looking at this vessel solely from a hostile point of view, and trying to find out its weak points, putting aside for the moment the many advantages it may have in a large area of shallow water like the Sea of Azov, and its possible advantages even in the open sea. If a sailor in a high-sided ship had to attack a broad vessel of that kind with an unprotected wide expanse of deck, what would be the natural tactics that he ought to adopt? Why, he should try to bring his armoured side as close to the exposed low-lying deck as possible, and to keep his guns depressed as close to that low, wide deck as possible. It might not be safe to lay the high-sided ship actually alongside, because, I suppose, the enemy would not be so foolish as to trust the defence of his circular

vessel entirely to guns and armour, but would have torpedoes bristling round the circumference as additional means of defence. But supposing he had such other means of torpedo defence as would make it dangerous to go alongside, the high-sided ironclad should still keep as close as it was safe to get, and the closer the better. A very few shells planted through the broad, low decks and bottom of the circular vessel, would suffice to dispose of it. We must remember that that deck presents a very large and wide target. It presents exactly what a gunner wants, not only for close firing, but also for distant firing. What a gunner likes to aim at in distant firing is not a target of great breadth, but a target of great depth—depth being to him akin to height. An ordinary ship is more easily hit when at an unknown distance, when presented end on to the gunner, than when broadside on, because a shot may, by a mis-judgment of the distance, go over the ship when broadside on, which might possibly hit the decks when she is end on. Therefore, a broad circular vessel would be far more likely to be hit than a narrow vessel. That a circular vessel would present a much smaller area for the hostile action of torpedoes is evident. But once struck by a proper torpedo charge, the advantage to be derived from cellular construction and water-tight compartments is small. A proper torpedo charge should make a hole through the bottom large enough for a coach and six to be driven through. I do not think any vessel could float with such a hole in her bottom even with all the water-tight compartments described, and torpedo charges should be so regulated that the smallest hole they ought to make would be one of that size. I do not, therefore, attach very much value to the extra amount of defence against torpedo gained from cellular construction by means of the circular principle. I find also that the armour of the circular vessel does not extend to the keel, but is the ordinary patch on the side, so that in this respect it is on an equality with high-sided ships. An artilleryman would not aim at that narrow patch, but he would try to avoid it, and there would be large deck surfaces above and bottom spaces below, which it would be quite possible to give a good account of. I have not spoken of the unquestionable advantages of the circular form, nor have I entered into the question from the naval architect's point of view; but, looking at it simply as a fighting vessel in open water, if I was given the choice of commanding either an ordinary high-sided ship with the same armament or this low-decked circular one, whether I consider the purpose of ramming or the resistance to torpedoes, or artillery purposes, I confess I should prefer the high-sided ship with its superior speed. Whatever advantage the short circular vessel might have in turning, it would have this disadvantage, that it could not possibly ram the broadside of any ship unless its own stern was very nearly at right angles to the side attacked, because the breadth of its own bow would in any angular approach keep the spear from touching the enemy, whilst the high-sided enemy aiming at any point whatever of the periphery might run at any part of the circular vessel, and would have only to keep his iron stem in a line with the centre of that saucer, with the certainty of always striking its side at right angles, so that he would most likely thrust his stem right into the heart of the citadel itself. With all its merits, there is a good deal to be said from a tactical point of view against the circular form of ironclad for deep-sea purposes, and I do not know any part of our coast which corresponds in expanse of shallow water to the Sea of Azov. I do not, therefore, see the necessity for vessels of that class being introduced for mere defensive purposes into this country. Even for the defence of the shallow banks which cover the entrance to the Thames, I would much prefer the same money's worth of Mr. Rendle's small gunboats to these costly circular ironclads, with very low freeboard, which offer very large deck targets to the enemy's fire.

Admiral Sir SPENCER ROBINSON, K.C.B.: The very late hour of the afternoon will prevent me troubling you with any but a very few remarks; indeed I should have risen a little sooner, but I thought there were others better qualified than myself to make various remarks on the very interesting lecture Mr. Reed has given us. My object is simply this, to bring back, if I could, the discussion to the point from which it started. The point Mr. Reed has very ably illustrated, and has given us a most interesting lecture upon is, whether for certain well defined purposes a circular ironclad was well designed, or whether it was not? A good many of the gentlemen who have spoken have diverged entirely from that subject. Some have gone into

æsthetic questions, and discussed with considerable blame, and no approbation whatever, the ugly ducks that have been launched upon the ocean, and that have done, and will do again, the work the country requires. I wish simply to say we have had in this lecture of Mr. Reed's a type of ship explained to us—no matter from what quarter it comes, whether the origin of this admirable ship for coast defence came from Russia, or came from Glasgow, or came from England—coupled with the fact that we have had the experience of one himself, a very eminent Naval architect, who has seen the performance of such a ship at sea, and is able to give us the whole particulars of her construction, and of the service for which she is likely to be employed, and apparently to be a master of the work she has to do. Therefore the question seems to me to be entirely this, is it not worth while for every person in the Naval profession, and for everybody who can influence the opinion of those authorities that govern the Navy, is it not worth while to consider every point of this new armoured vessel most carefully, and to see whether it does or does not contain the elements of that very great success which Mr. Reed has shown it possibly may contain? The question is certainly not as some have put it, whether a circular ship is in all respects the very best possible vessel you could put upon the ocean to make long voyages, or to fight your actions against other ships of different classes; but it is whether this circular ship is not capable of defending places which no other ship could defend, and not only capable of doing so but capable of assaulting places that no other ship could assault? Those are questions that Mr. Reed, without any dogmatism, has put before you as matters deserving the investigation the Admiralty is prepared to give it, and I think as matters not deserving the ridicule of any person connected with Naval architecture and Naval architects, and certainly not deserving the ridicule of any person who may some day or other be called upon to fight the battles of this country. Mr. Reed, having put before us the qualities of this circular ship and its adaptability for certain purposes of offence and defence, tells you that he sees no limit to its application, and that it is possible that hereafter the notorious and self-evident want of speed in these circular vessels might be cured by methods that he has not yet investigated, but that he has shown to any reasonable mind are capable of being investigated, and so that the problem may be ultimately solved. These are the points, therefore, which I think every Naval Officer and all the eminent artilleryists and engineers here present should take into consideration.—Have we or not, a reason to suppose that for certain well defined purposes, men have in the circular ship the means of carrying out our purposes practically and fully? And is it not possible by further investigation to find whether the principle is not applicable still further, and whether that point of Naval architecture, that point in all ships which I should be the first to uphold, namely, excessive speed, whether that cannot be obtained in these forms as well as it can be obtained in the usual forms of ships? And notwithstanding what we have heard about their ugliness, notwithstanding that we have heard that sailors are disgusted with these ships and with recent types of war ships, we may depend upon this, if the principle is a sound one we shall never find any sailor objecting to go to sea in a circular ship or even in a square one if he is required to do so.

H. WRIGHT, Esq.: As my name has been mentioned in the course of this discussion, will you allow me to say that Mr. Elder explained to me that one of the chief features of his vessel was that high speed would be most certainly attained. The diagrams he showed to me years ago before ever the subject was brought before this Institution, agreed, so far as I can recollect, distinctly with these. I know also that he considered the revolution of the vessel would be one of the most important features in an attack upon an enemy's vessel.

Admiral W. HOUSTON STEWART, C.B.: I wish to say I had a great deal of conversation with Admiral Popoff as to the circular ironclad, and he gave me to understand he originally designed or intended it to protect certain localities in which he intended to place obstructions against the advance of ships. These obstructions owing to the draught of water could not be protected by ironclads or by fixed forts, and therefore could be readily removed by an enemy if unopposed; and it was for their protection he designed the circular ironclad. After he had proceeded with them he found that they were capable of being moved about with much greater facility, and of giving greater advantages as to their sea-going qualities, than he had

originally supposed, therefore the question was opened out to his mind and to many others in Russia, that this circular form which enabled him to carry very thick armour with a light draught of water might be used to a much greater extent than he had originally contemplated, which, as I have said, was to defend obstructed places where he could not place the usual sort of ironclads, and he could not place forts. Perhaps Mr. Reed will say if that was the idea that was in Admiral Popoff's mind—

Mr. REED : Quite so.

Admiral STEWART : It may be satisfactory if I mention a report I received the other day from the Commander-in-Chief in China, who commands one of our ironclads designed by Mr. Reed. Mr. Reed has touched on a subject that I am sure is often present to the minds of Naval Officers—the behaviour of ironclads in a sea-way. Admiral Ryder writes to me from the "Audacious" saying, "Whatever objections may have been raised to ships of the 'Audacious' class, the longer experience I have of them the more I am struck with their wonderful steadiness. I have just lately made (he says) a passage running before a heavy sea and strong wind, all my stern ports barred in, and to our great surprise the ship did not roll more than 2° to 1° each way. I half made my mind up to broach her to, to see what she would do in such a sea, but the helmsman did it for me. In giving the ship a yaw he brought her to the wind, and positively to our great surprise she declined to take any notice of the sea at all. An ironclad flag-ship of a first-class naval power accompanied me. We were both proceeding before the same sea. My flag-ship rolling 2° to 1°, the flag-ship of the other power rolling 20°. I am happy to say that we are on the most friendly terms: if the conditions were altered I think the steady platform would have decidedly a great advantage."

Admiral INGELFIELD : The words "ugly, unhealthy, and unwholesome" were applied just now to one of our principal ironclads. I have just returned from Malta, and I saw the "Devastation" having come into port from a long cruise. She went out with the Mediterranean squadron, and returned a month or six weeks after their cruise was over; and the Captain reported to me she had only two small defects, and those were put to rights in a couple of days. He spoke of the ship as being perfectly seaworthy, wholesome, and comfortable for the men and Officers, and everything he could wish. I think it is my duty to bear this testimony to the qualities of one of our special ironclads of the present day.

Admiral SELWYN : I think the points raised by Mr. Reed in his paper have scarcely received the discussion which he might well have expected. I have always myself been an advocate of Mr. Elder's ideas of marine construction, and I still hold to the same theory as far as it is a theory; but I am disappointed to see that in seeking for a less draught of water Admiral Popoff has thought it necessary to give a very abrupt turn-up to the side of the ship, and I think in this probably is to be found the secret of the extreme power required to drive that particular circular ship. Mr. Elder's models, although they did preserve a species of spherical form, yet provided quite sufficient capacity in tonnage to have carried all the provisions, stores, guns, and armour that we could possibly have wished to put into them; but he also did not ignore the fact that screws were a very awkward mode of propulsion in such a vessel, and he provided another form of internal propulsion which I am persuaded will one day take its place very high among the modes of propulsion, if indeed it does not supersede all others, namely, that of the hydraulic propeller, thus obviating the exposed situation of the screws, which is one of the chief defects of this vessel, and which might probably cause their destruction by the very smallest unarmoured vessel that could run against them. Mr. Reed says that by elongating the vessel better lines can be obtained, and therefore more speed; and those gentlemen who remember what the shape of the centreboard yacht is, or the form of a Chinese junk, would see what might be the elongation preserving the spherical outline. I do not exactly like the form Mr. Reed has shown, and an approach to the centreboard form would give additional advantages while it might preserve the sail power. I do not care how much power is put in a vessel, or how much coal if you tell me I must not use it until I go into action, for under such circumstances no Officer or crew can be properly trained in the use of their vessel. If it be necessary to go to sea and carefully preserve a very low rate of speed, and

to limit the use of the steam till even the engineers get rusty over their furnaces, I think decidedly sail power should not be ignored. If the centreboard boat with its single sail, or the Chinese junk with its three sails at the outside can obtain very high speed, I think there is no earthly reason, if we will consent to abandon all our traditions about the placing of masts and the description of yards, why we should not get sail power in these circular vessels quite sufficient to drive them about the ocean when steam is not allowed or available. But the question of armour carried on these vessels assumes a different complexion the instant the spherical outlines are preserved. It then becomes possible to carry a thickness almost unlimited as well eight feet as eight inches. I am not one of those who attach any very large importance to the sawing motion advocated by Mr. Elder, but I think ramming will have a great offensive effect in that as in every other ship; and neither am I one of those who mistake the question as to the surface presented by a circular vessel of this description considered as the area of a target. I think if you show me a target whose elevation is twenty feet above the water-line and some six hundred feet long, I shall be more likely to hit that than a circular vessel which exposes no height above the water-line and only half the length, for she can be sunk up to the edge of her armour in action, therefore I do not attach much weight to such objections. To the question of Artillery *en barbette* I do attach a certain weight; but it disappears before the fact that Admiral Popoff has seen that the barbette battery is not so applicable as it might be, and that the new ship is expressly designed for carrying disappearing carriages. My friend, Major Moncrieff, is in Scotland, or I am quite sure he would show you that his principle is particularly applicable to this form of ship. The question of a steady platform has been, since I can remember Artillery questions in this theatre, regarded as of the very highest importance, and considering that more defence must be given to our shores in the absence of our fleets at sea, it is no answer to say that a comparison may be drawn between the slightly sea-going ship and the unsightly sea-going ship in favour of the slightly ship if it be not proposed to put forward for that purpose any such ship. This is devised for a special purpose, and as it has answered beyond expectation it is not worth while to consider that principle as one to be discussed and provided for in our own Naval Estimates, instead of ships which have been said in the Houses of Parliament to be entirely unfit to defend the coast on account of their draught of water? I am not one of those who undervalue the comforts of a sailor's home, but I am one of those who do not fear to say that there will always be found sailors ready to go to sea in anything thought to be fit by the powers and authorities that be, for the defence of the nation. I believe the principle to be good, that it may be successfully developed so as to give high speed under steam and great carrying power whether of guns or armour, and that it is not at all impossible so to develop and mast it as to combine with those qualities great powers under sail and practical unsinkability.

Mr. E. J. REED: I am very much obliged to the Naval Officers who have spoken in this debate with the single exception of one, and that is my friend Captain Dawson, because I do not understand what object any thoughtful Naval Officer can have in view in introducing epithets like "diving bell," and phrases of that kind into what ought to be, and what I, to the best of my humble ability, endeavoured to make, a simple scientific discussion. I shall not answer Captain Dawson because I think he has been answered already, and certainly the spirit of his speech has been answered by other Naval Officers who have spoken. Nor shall I take very much pains to reply to my esteemed friend Mr. Scott Russell, because he has an advantage over me at all times, which is a very serious one, and with which I cannot compete, for if not omniscient he knows everything. And he has done a good deal too, because I always note in these discussions it is impossible to speak about the "Warrior" in never so incidental a manner without bringing Mr. Scott Russell to his feet to claim the design of her. Well, I have heard him claim that design a great many times, and I have heard him very justly claim for the design "great merit," and I am sure I have spoken of the "Warrior" on a thousand occasions with great consideration; but we are discussing to-day, Sir, how to send to sea very thick armour and very heavy guns, and I read in *The Times* newspaper a few days ago that the Chief Constructor of Portsmouth Dockyard had stated that the "Warrior" was relegated to harbour service, as a ship unfit to take her part in the fights of the future of our

Navy. Therefore I do not understand why we are to be debarred by continual harping back upon the design of the "Warrior," from discussing the new phrases of the question as they arise. Mr. Scott Russell undertook to tell us all about these circular ships. At first he refused them the name of ships, as did Captain Dawson; and I am sure I refused them the name of ships also. I took very great pains to make it clear I was asking this Institution to consider not the construction of ordinary ships, but the construction of engines of war, the primary objects of which were to take to sea heavy guns protected by thick armour. And that observation, which I carefully abided by throughout my paper, answers a great deal that has been said in disparagement. Mr. Scott Russell undertook to tell us all about these circular vessels, but he seems to have been wrong in what he told us, because he told us they were introduced by Mr. Elder only for ferry purposes, and he was immediately succeeded by a gentleman who told us it was distinctly a mistake, that they were introduced for the kind of purpose we are here considering to-day.

MR. SCOTT RUSSELL: I said they were supplied by him to be used for that purpose.

MR. E. J. REED: I accept the correction, but I found Mr. Scott Russell's remarks went so wide of the various interesting points that I hoped they would be confined to, that I am obliged to track him into these very desultory observations which he made. Mr. William Smith remarked that Mr. Elder did design these vessels with flat bottoms. I should be sorry to say he did not. Mr. Smith also stated that Mr. Elder showed me the designs of these vessels. That is certainly most true. It is equally true Sir Samuel Baker showed me his, but in both cases I have spoken only from memory, for, as I have said, my object was not to press these views upon the public, but simply to comply with the request of the Council of the Institution to explain these vessels. I hope that that fact will be borne in mind, because I have not appeared here to-day for the purpose of thrusting and forcing circular ships upon anybody's adoption. I concluded my paper, as Sir Spencer Robinson kindly reminded you, by simply saying the subject seemed to me to be so important as to require the careful and close attention of the Admiralty, and I expressed my confident opinion that the Officers of the Admiralty associated with Mr. Froude were quite capable of working the thing out; and I am quite sure from the very proper spirit in which Admiral Stewart was good enough to address the meeting you will infer that this subject will receive full consideration.

Admiral STEWART: I intended to say, though I omitted to do so, that the question did deserve and should receive the greatest consideration.

MR. E. J. REED: I am much obliged. I am sure that is all that I desire. I have no object whatever in view except seeing the principle of short lengths and great breadths made available to our Navy, in so far as it is consistent with other qualities. I must turn again to Mr. Scott Russell, and distinctly disclaim the strange imputation that he brought against this paper and myself, when he said I had asked you to treat as altogether a secondary thing the seaworthiness of the sort of vessels I was discussing. Why, I took a good deal of pains to explain the grounds upon which I thought such vessels could be made thoroughly seaworthy. I never put seaworthiness into any secondary position, because I take it for granted that every man who undertakes to design a ship in which the British sailor is to be sent to sea, will make the seaworthiness and safety of that ship his first consideration; and I may say more than that; I may say—and I am sure the distinguished Officer under whom I served, and who is present, and who has spoken, will bear witness to the fact—that so far as my humble influence in his office went, it was always against the adoption of contrivances and schemes for sacrificing the seaworthiness of British ships. Mr. Scott Russell further said, that the speed of a ship at once determines its length, and that is a doctrine I have heard him propound many times before. (MR. SCOTT RUSSELL: It is not quite accurate.) Well, perhaps a little inaccuracy will be excused in me as well as in others. I understood Mr. Scott Russell to say, and I have often thought I heard him say the same before, that when you have determined the speed it will give you the length. (MR. SCOTT RUSSELL: I added the word "minimum" length.) If I had heard that word I should have attached a different value to the observation. I think from Mr. Scott Russell's point of view, it is reasonable to suppose that the speed of the ship does determine the minimum

length. I do not myself believe it does anything of the kind. I believe, and that is precisely the point I want brought out in the investigation of this subject, that the length has so much to do with the quantity of armour you are obliged to carry in armoured vessels, that you must not make it the first consideration in determining the dimensions and form of your vessel. He says, and he finished with that, that you, gentlemen, can have all you want without departing from handsome forms and thoroughly sea-going ships. I do not suppose anyone ever doubted that proposition, and I should hardly think a meeting of cultivated gentlemen in the centre of London need to be told that all our plans and discussions are not based upon the assumption that you cannot have what you want if you choose to spend unlimited money in obtaining it; but our efforts are always directed to get economically, cheaply, and in conjunction with a number of other things, what we want. I think it would be perfect madness for the administrators of the Navy to set up an æsthetic standard, which, at the best, changes from day to day; for people who used to imagine every ironclad the ugliest thing possible, now consider some of the ironclads as amongst the handsomest productions of the modern epoch. I distinctly remember the Board of Admiralty, consisting of some of the most eminent naval Officers of the Service, requiring to steam several times round the bow of the "Hercules," because they thought it was the handsomest and most appropriate bow for a ship which they had ever seen. With regard to the origin of these vessels, I do not wish to be understood to have touched upon the respective merits of Mr. Elder, Sir Samuel Baker, or others in this matter; in fact, I think myself it argues rather a low standard of feeling, when we find continually in discussions of this kind, when we are dealing with actual results that have been obtained, people who proposed them in an abstract and theoretical form spring up and almost stop the discussions upon the essential merits of the thing, to discuss who had the first finger in it. I do not wish to say anything too immodest, but I must say I attend a good many discussions in which, if I thought it prudent and proper, I might say I had thought beforehand of the novelties then being propounded, but I do not think that is a subject to engage our attention in matters of this kind.

Sir John Adye made some remarks, which are very true, with regard to the mounting of guns on the *en barbette* system; but I need not point out, because Admiral Selwyn has stated it, that Admiral Popoff in his second vessel abandoned the *en barbette* system, which was quite an incident of the first design, and has adopted the disappearing principle in the second, and no doubt he is perfectly free in so far as any limitations of the circular form are involved, to adopt turrets or any other means of carrying guns that may be desirable. There is nothing in the circular system at all to interfere with that. Admiral Stewart appealed to me as to the objects with which these vessels were introduced. A memorandum has been put into my hand to-day by a friend of Admiral Popoff, as a point for me to fall back upon, if necessary. "The idea of circular ironclads was originated in a desire to strengthen the defences of Kertch Strait and of the Dnieper Liman; and, therefore, these vessels were built for the special service, viz., the action behind certain obstructions, such as, for instance, a row of fixed torpedoes, &c., laid down in the narrowest place of these Straits, so that these vessels may choose the distance, behind that line, and on approach of the enemy towards that line, they can retreat, and place themselves at such a position that the men at the guns would be safe from the rifle fire of the enemy. Thus, the open turret and speed of eight knots of the 'Novgorod' do not form any deficiency whatever, considering the real purpose for which that first ship was designed." I feel sure that, in the minds of the bulk of this meeting, the subject has been lifted by my paper off the narrow basis in which it would naturally be placed by many persons. I view it only from this point of view. The "Inflexible" is our latest design. I hope, in referring to her, I shall not be supposed to view the ship depreciatingly. I think the vessel is a vessel of remarkably high character, which will be found to express the power of this country in a most admirable manner; but, still speaking quite abstractedly, and with a view to the future progress of design, I simply say we must recognize in such a construction the existence of those lengthened ends. I believe the circular form, or the circular form with a bow, for sea-going purposes, will be found to give advantages even over this type, and you have heard from the

responsible head of the construction branch of the Navy that the subject is receiving his consideration: therefore I do feel I have not brought an unworthy subject before you. I will take the liberty of thanking Admiral Inglefield, as well as Admiral Stewart, for their kind feeling in choosing this occasion to say a good word, and a practical word coming from trustworthy sources, respecting the qualities of certain of Her Majesty's ships. You know here well enough how anxious a task the construction of those ships is, and you have also heard to-day how ready some persons are to cast discredit, contumely, and ridicule upon them. It is a very satisfactory thing to know, when ships get to sea on service, that those vessels give satisfaction to their Officers. Here we find a flag-ship in a distant part of the world, and another after performing a lengthened voyage in the Mediterranean, giving a good account of themselves, and it is very gratifying that, in meetings like this, Officers should have the generosity and spirit to rise and say that Her Majesty's ships are not what many persons suppose them to be, but are efficient and perform their duty well. I thank you, Sir, and the meeting very much indeed, for the extreme kindness with which you have listened both to my paper and to my remarks in reply.

The CHAIRMAN: I am sure every one present will join with me in offering a hearty and cordial vote of thanks to Mr. Reed for his very excellent lecture.

LECTURE.

Friday, February 18th, 1876.

ADMIRAL SIR HASTINGS R. YELVERTON, G.C.B., in the Chair.

HOW BEST TO IMPROVE AND KEEP UP THE SEAMEN OF THE COUNTRY.

By T. BRASSET, Esq., M.P.

It will be my object in the present paper to be practical. There has of late been too much vague declamation as to the decay of our British seamen.

I do not therefore propose to dwell at length on the faults of our sailors, I shall prefer to occupy your time with proposals for ameliorating their condition, their character, and their seamanship.

It will be convenient to clear the difficult path before us by stating the number of foreigners employed, and the annual waste of seamen in our Merchant Service. With regard to the number of foreigners employed under the British flag, while the proportion is, no doubt, considerable, the number does not increase. The proportion of foreigners to British seamen, which was 12·6 in 1864, was reduced to 10·87 in 1873. I may in this place observe, that some of the ablest of our shipowners have entertained the opinion that foreigners are an indispensable element in our Merchant Service. To quote only one authority, this opinion was expressed by Mr. Lamport, in giving evidence before Mr. Lindsay's Committee in 1860. He was asked, "What, in your opinion, would have been the present state of things, had the navigation laws not been repealed?" He replied, "I think there would have been more British tonnage afloat than there is now, but I do not think we should have been able to man our British ships with British sailors." "The rate of wages must have been tremendous, in order to bring this about."

It has been computed that, from various causes—death, drowning, desertion, the giving up of employment at sea in order to obtain occupation on shore—our Mercantile Marine loses every year about 16,000 men. The apprenticeship system supplies about 3,500 men per annum, and the training-ships probably as many more. The boys not apprenticed, and the ordinary seamen, supply the remaining 9,000 men.

As a matter of fact, no great difficulty has been experienced in obtaining the number of men required for the Merchant Service. The quality may have been unsatisfactory; but the number has been adequate. Our shipowners have never experienced the difficulty which has been felt in Germany, where laden ships have been detained for weeks, because a crew could not be obtained.

In a recent communication to *The Times*, Mr. Dunlop, a large shipowner, of Glasgow, states that no shipowner finds any difficulty at the present time in manning his vessel; and that, if the number of seamen were materially increased, it could only produce a redundancy.

Having shown that there is no reasonable ground for a complaint of a deficiency in point of number, we have now to consider the allegations as to the want of discipline and seamanship.

It may be pointed out, *in limine*, that the same complaints have been urged before every Royal Commission and Committee of Parliament which has been appointed, since the termination of the great Continental War, to inquire into maritime affairs.

As on all similar occasions in the past, so in the latest inquiry by the Royal Commission on unseaworthy ships, witness after witness dilated on the profligacy, the drunkenness, the physical, the professional, and the moral deterioration of our seamen. The Mercantile Marine is acknowledged to be the true backbone of the fighting Navy; and those who heard the gloomy story could scarcely suppress a misgiving that England had forfeited her claim to be the mistress of the seas.

When, however, we turn over the page of history, we find that the crews even of our fighting vessels have often contained a large proportion of ill-conducted and unskilful men. Many seamen serving in the Royal Navy in the early years of the present century, unwilling captives of the press-gang, were equally destitute of patriotism and fidelity. It has been said that, on one occasion, when the fleet was being paid off at Portsmouth, a large number of the seamen refused to come on shore, and sailed direct to Brest to take service in the French Fleet. In the narrative of the capture of the British frigate "Macedonia" by the American frigate "United States," the historian James gives some details which I shall venture to quote:—

"The great proportion of British seamen among the crew of the American frigate accounted, it is said, for so many of her guns being named after British ships, and some of the most celebrated British naval victories. 'Captain Carden,' says Mr. Marshall, 'observing "Victory" painted on the ship's side over one port, and 'Nelson' over another, asked Commodore Decatur the reason of so strange an anomaly; he answered: 'The men belonging to those guns served many years with Lord Nelson, and in the 'Victory.' 'The crew of the gun named Nelson were once bargemen to that great chief, and they claim the privilege of using his illustrious name in the way you have seen.' The Commodore also publicly declared to Captain Carden that there was not a seaman in his ship who had not served from five to twelve years in a British man-of-war."

Passing on to the inquiries by the Manning Committee in 1853, the advantages, if any there were, of compulsory apprenticeship should have been conspicuously shown in the high discipline of the Mercantile Marine at that period. What, however, was the language held by the shipowners in regard to their crews? It was most unfavourable. The Chairman of the London Shipowners,

Mr. Phillips, went so far as to declare that the seamen were a demoralised race, and that the permission to man British ships with foreign seamen would be productive of great good.

I am not attempting to deny that many of our merchant seamen are unworthy of the British flag, but when we are told that their condition is worse than it was, I ask for evidence in support of this unwelcome assertion. What new circumstances have arisen to injure the character of our seamen? Some influences there must have been working for their good. In part owing to the introduction of a test examination, our merchant ships are more ably commanded than they were. Our seamen are acknowledged to be a better educated body; the ships in which they sail are greatly improved in comfort, in safety, and in speed. In the old days there were no ships which could be compared with the noble iron clippers of the present day. On the other hand, we cannot fail to recognise the injurious tendency of some of the modern changes in the constitution of the Merchant Service. Steamers have drawn away the best men from the foreign-going sailing ships. A higher rate of wages is paid in steamers, and they offer the further advantages of a shorter absence from, and a periodical return to, a home port, with superior provisions, lighter work, and better accommodation.

In the foreign trade the best men, as a consequence, have been separated from the mass employed in the sailing ships; and with a result analogous to that which followed in the French Army from the formation of an excessive number of *corps d'élite*, comprising the Imperial Guards, cavalry, and artillery. When the best recruits had been picked out for all those favoured corps, the residuum which remained to form the infantry of the line was destitute alike of physical vigour and of military ardour.

Again, the growth of the large towns, which are the great entrepôts of our maritime commerce, has tended to the degradation of the seamen employed in the foreign trade. The temptations to vice multiply with the increasing density of the population; in the smaller towns the atmosphere is less contaminated.

It is more difficult to draw any general conclusion as to the quality of seamen than it is to ascertain the proportion which the supply bears to the demand; but there is one arithmetical test by which the efficiency of the crews can be partly determined, namely, by noting the increase or the reduction in the number of men employed to man a given tonnage. If this test be applied, it will be found that there is no evidence to show that there has been a deterioration in the quality of the seamen.

In 1814, the Merchant Service gave employment to 173,000 men, or about the same number of men as in 1861; but in the interval the tonnage of our shipping had increased from 2,681,000 tons, at the earlier date, to 5,895,000 tons at the later. The proportion of men to 100 tons in sailing ships was 4·17 in 1854, 3·25 in 1869, and 3·22 in 1873.

On the whole it would appear that, while our seamen have not deteriorated, yet the character and seamanship of a large number among

them leaves much to be desired. In the coasting trade, however, there are no complaints. The vessels are manned by the owners or part owners and their families, just as they have been for many years past. Neither are there any general complaints on the part of owners of steamers. Mr. McIver, his partner, Mr. Burns, and Mr. Wilson, of Hull, when examined by the Duke of Somerset, spoke of their men in terms of commendation; and their opinion, backed by the officials of the Board of Trade, presented a cheering contrast to the gloomy picture drawn by the owners of sailing vessels. On the other hand, in sailing ships employed in long voyages, the crews are composed of the residuum of the seamen—men too often without homes, and without characters to lose, careless and reckless as they have ever been, without the slightest spark of loyalty to their employers, and probably greatly inferior in all these respects to any class of skilled workmen on shore.

To what causes are we to ascribe these defects, and how can they be remedied? Among the causes I would enumerate:—(1.) The absence of encouragements or pecuniary reward for good conduct or skilful seamanship; (2.) Insufficiency of pay, at least, until a very recent date, and, in some ships, bad treatment; (3.) The system of payment in advance before sailing, and the delay in paying off crews on their arrival in port; (4.) The want of systematic training for seamen; (5.) The inadequate professional status of the officers of the Merchant Service.

Taking these subjects in the order in which they have been enumerated, we have first to deal with the question of wages. The owners of sailing ships stand alone among the employers of this country in expressing a universal concurrence of opinion that their men are deteriorating. The explanation is not far to seek.

Until a very recent period, the wages of seamen have been low by comparison with the reward of any description of labour, requiring the same skill and experience, ashore.

Looking back to the earlier dates included in the tables, published by the Board of Trade, we find that the wages of an able seaman rarely exceeded 50s. a-month; and when we take into view the many privations of a seaman's life, the inferiority of his situation to that of any other skilled labourer, was such, that, unless there had been some compensating circumstances, our ships could not have been manned.

There are two considerations which together have operated to keep down the wages of the seamen. The apprenticeship to the sea has been less expensive than the apprenticeship to any other skilled trade. "The fact," says Mr. Mill, "that a course of instruction is required of even a low degree of costliness, or that the labourer must be maintained, for a considerable time, from other sources, suffices everywhere to exclude the great body of the labouring people from the possibility of such competition."

Boys, from the moment they go afloat, cease to be an expense to their parents; hence the poorest among the labouring class, who alas! form the majority, are able to bring up their sons to the sea.

Again, the employment of the sailor has been ill-paid, because it has been invested with all the charms which belong to an adventurous life. "The dangers," says Adam Smith, "and hair-breadth escapes of a life of adventures, instead of disheartening young people, seem frequently to recommend a trade to them. A tender mother among the inferior ranks of the people is often afraid to send her son to a school at a seaport town, lest the sight of the ships, and the conversation and adventures of the sailors should entice him to go to sea. The distant prospect of hazards from which we can hope to extricate ourselves by courage and address is not disagreeable to us, and does not raise the wages of labour in any employment."

In pointing out that in foreign-going sailing-ships generally, and especially in those which have been the property of men of limited capital, the wages have not been sufficient to attract good men into the employment, I do not imply that there has been a selfish unwillingness on the part of the shipowners to do justice to the seamen. I am simply pointing out that the conditions offered have been less attractive than those presented by other employments.

Quite recently the wages of seamen have been advanced, doubtless in consequence of the competition for labour, caused by the unprecedented activity of other branches of trade. It cannot now be said that the seaman is insufficiently rewarded. The rapid advance in the rate of pay, which has lately taken place, will in time produce its effect, and probably encourage a large number of the youth of this country to look for employment afloat. Seamen, however, cannot be made in a day. The benefits to be derived from the increased supply of trained men will not be realised until the boys, who are now being attracted to the sea, have had sufficient time to learn their business.

Bad treatment has been assigned as one of the reasons why in some vessels a difficulty has been experienced in regard to manning. Whenever it has been alleged that the scale of provisions in any ships in the merchant service is insufficient, universal indignation has been expressed by shipowners. In order, therefore, to prove that there is a foundation for what has been stated, I quote the following passage from the Report of Dr. Roe, Surgeon to the British Seamen's Hospital at Callao, in answer to a circular issued from the Board of Trade by Mr. Shaw Lefevre:—"By far the greater number of British vessels which visit this port are those which have made long voyages; they have taken cargoes to some port in China, Australia, New Zealand, Brazil, the East Indies, or elsewhere, and they have come on here to load with guano, having been on the average upwards of a year in performing the voyage from England to Callao. Amongst the crews of these vessels desertions are very frequent, the principal causes being—

- "1. The physical condition of the seamen.
- "2. The fact that a considerable sum of money is due to each man on his arrival here.
- "3. The system prevailing at this port of paying three months' wages in advance to each man who ships.

"At the British hospital, in the four years commencing 1st October, 1865, and ending 30th September, 1869, 251 cases of scurvy were received from 57 vessels, 27 ships sending each but a single case, and 13 ships sending each nine cases and upwards. Official investigations were instituted into the circumstances attendant on the voyages of 13 of the vessels, the crews of which were affected by scurvy, and our inquiries have established the inadequacy of this diet to maintain the health of seamen, even when supplemented by the anti-scorbutics enforced by the Merchant Shipping Act of 1867, as scurvy occurred in those vessels only in which the scale was adhered to."

The following scale will show the comparative values of different articles of food as anti-scorbutics :—

<i>Powerful Anti-scorbutics.</i>	<i>Indifferent Anti-scorbutics.</i>	<i>Powerless as Anti-scorbutics.</i>
1. Fresh juicy vegetables, as raw potatoes, onions, &c. 2. Fresh fruits, as oranges, apples. 3. Fruits and vegetables preserved in sugar, or otherwise, with their juices.	1. Dried vegetable matter, as preserved potatoes, compressed vegetables, &c. 2. Fresh or preserved meats, especially with-in the tropics. 3. Vinegar. Lime-juice as found on board merchant ships after 12 months' voyage.	1. Rice, barley, sago, arrowroot, &c.

"The salt beef and salt pork constitute the main articles of a seaman's food, and are supposed to represent an amount of nourishment which they are far from containing. Scurvy is essentially starvation. The histories of such cases as proved fatal on board the ships, and they were not a few, showed that those who laboured longest and hardest were the first to die. Officers and others, who were not required to use physical exertion, escaped the disease. One man was a prisoner, and fed on bread and water during a voyage of upwards of ninety days; he took scarcely any exercise, and for a considerable portion of the time never moved from his cell; he arrived here in good health and without a trace of scurvy, whereas all his shipmates were more or less severely affected.

"The great majority of the cases of scurvy recorded above, originated in vessels, the crews of which were not allowed vegetables whilst the ships were in port. Let it be assumed that the expense of providing food better adapted to maintain the health of the men would be greater than the expense of providing food according to the scale now in use. The food supplied is but a part of the seamen's wages, part of the value paid for their services. If, therefore, more value be given to the seaman in food, less will be required in money; and no wages will be better appreciated by the seaman than good food."

I earnestly hope that all the suggestions contained in the letter of Dr. Roe may be adopted.

The system of making advances of wages to seamen is a subject closely connected with the general question of the rate of pay. I cordially concur with the Royal Commission in their unhesitating condemnation of the advance note. Seamen are the only class of working men who are paid in advance for labour that has not been performed. It may be urged that it is hard to deny a small sum in advance to a man who is about to embark on a ten months' voyage. It may be said that he has an outfit to provide and expenses to pay for his board on shore while seeking an engagement. The answer is, that in ninety-nine cases out of a hundred, the money paid in advance is consumed in debauchery; that the man comes on board destitute of clothes, but minus the month's wages. He has discounted his advance note at a usurious rate of interest, and has probably been paid not in money, but in the most deleterious liquors. The crimp alone has derived a profit on the transaction.

Some shipowners have strongly opposed the abolition of the advance note. They have been accustomed to rely on the co-operation of the crimp to get their men on board before sailing, and they apprehend that the abolition of the advance note will lead to a small rise of wages.

For the reasons I have stated, I disagree with the objections to the reform proposed by the Royal Commission. Until a seaman is taught to depend upon his past earnings, to be sufficiently careful of the large sums often received on paying off, so as to be able to provide therefrom the kit required for the next voyage, you cannot look for improvement in their moral character.

The delay in paying off is at least as fruitful of evil as the payment of wages in advance. If a delay of forty-eight hours occurs after the arrival of a ship in dock, the seamen are necessarily thrown into the hands of the crimps. True it is that sailors' homes have been established at the large ports, and they have done great good; but, after all, the sailor's home bears a close resemblance to an embellished prison, and is not the genial and attractive hostel, to which a sailor would naturally resort, who has been cribbed, cabined, and confined under tight discipline for many months on board ship. Captain Dawson has enlarged in a recent paper in such sympathetic language on the necessity for an immediate settlement of wages after the arrival of a ship, that I need not insist further on this point.

I would offer one more suggestion connected with the question of wages which ought not to be omitted in a general review of this subject, although it is not within the province of legislation to remedy the evil which I seek to point out.

Surely it is a mistake in the Merchant Service to pay every seaman before the mast at the same rate. By preserving this unbroken uniformity, you may, it is true, avoid the risk of exciting envy and jealousy among the crew; but on the other hand, you give no encouragement under such a system to special exertion and good conduct. You draw no distinction between efficiency and utter

inexperience, between the genuine able seaman, and the man who has no right to claim that rating. Piece-work is impossible on board ship; at least on board ships engaged in the foreign trade. On a coasting voyage, as, for example, in the colliers plying between the north-eastern ports and the Thames, the plan of paying by the run was universal, but this arrangement is inapplicable to the Indian or the colonial trade. If, however, payment by results cannot be introduced; it becomes the more essential to encourage merit by a flow of promotion, and by advantages in point of pay. In the numerous ratings in the Royal Navy, we have an example of what may be done in this direction. The regulations of the Navy in this and all other matters are well worthy of study by shipowners. They represent the traditions of an ancient service, and the thoughts of many ingenious and capable men, whose business it has been to maintain the discipline and to animate the exertions of large bodies of men.

There should be a voluntary examination for the rating of A.B. The examination should be practical and interlocutory, similar to that which candidates for admission to the Naval Reserve are required to pass. Shipowners would know that men, who could obtain a certificate of A.B. by examination, were not impostors; and captains ought to be allowed by their owners to give higher wages to certificated men. As soon as it became known that something was to be gained by passing an examination, every seaman would try to pass. It might then be expedient to require that a man should have passed the examination, before he was allowed to ship as an able seaman.

I may mention that several Seamen's Associations have petitioned to Parliament in favour of this proposal. Such a regulation would involve no hardship on the shipowner. He would be left perfectly free in the selection of his crew and could ship as large or as small a proportion of A.B.'s as he thought fit.

Again, an increase of pay should be given for good conduct. This is done by Mr. Balfour and other shipowners of Liverpool, and Mr. Balfour, who was specially sent up to give evidence before the Commission as to the deterioration of seamen, admitted that the complaints, which he poured forth so profusely, did not apply to the men, who sailed in his ships.

Would it not cost less and would not the merchantmen be more efficiently manned, if higher wages were paid, fewer hands employed, and more care taken in the selection of the crew? It is a common practice with shipowners to defer the engagement of the crew, until a day or two before their ships are ready to sail. The captain is then instructed to go down to the shipping office, and in an hour to collect together a crew for a voyage round the world, from among a number of men, whom he has never seen before. In what other trade can a parallel be quoted to this haphazard and perilous system? Would it be reasonable to expect that the skilled labour required for a shipbuilder's yard or an engineering works could be obtained at a moment's notice by sending out a foreman into the adjacent highway? In all well-organized industrial establishments it is the custom to keep together a nucleus of workmen; and this is done even in bad times,

and when the payment of the men's wages is a heavy loss to the employer.

Here I would offer a remark on the desirability of more frequent and direct personal relations between the shipowners and their seamen.

When shipowners complain that their seamen are not anxious to promote their employers' interests, that they show no gratitude for the care and the money which have been freely lavished, to furnish them with good provisions, to make their forecables comfortable, and to supply them, it may be, with books and other advantages not included in the letter of the bond, it must be remembered that mere liberality will not suffice to arouse the sentiment of personal loyalty. A non-resident proprietor may let his land at low rents, and be more than liberal in the repairs of his cottages, and yet, unless he lives among the people on his estate he will fail to keep up the warm and devoted attachment, which, in feudal times and since, has so often united together the owner and the tillers of the soil.

I have dwelt, I fear, too long on the question of wages. Except in the abolition of the advance note, and perhaps in requiring payment of a certain rate of interest for every day's delay in the settlement of wages, after the arrival of the ship, the subject is beyond the scope of legislation. It is for the shipowners to consider the question, and by a wise generosity to encourage a good class of our working population to follow the sea.

It is now necessary to refer to the subject of training seamen for the Merchant Service. The abolition of compulsory apprenticeship has been deplored by many, and the alleged deterioration of seamen has been attributed to the relaxation of the laws by which it was enforced. We have, however, the testimony of the late Mr. Lamport and others, to show that compulsory apprenticeship led to grave abuses. There is no reason why an ordinary seaman or boy should not pick up seamanship, as well, when serving in that capacity afloat as if he were regularly indentured. It is a fatal objection to the compulsory plan that boys who are worth anything are certain to break their indentures. Such, at least, has been the experience of the present training ships. The Managing Committees have, therefore, determined not to ship any more boys as apprentices.

I now turn to another and a less impracticable plan for increasing the supply of seamen by the establishment of additional school ships. I commence by considering the proposal in a politico-economical aspect.

An artificial training system, must, if it is to produce a radical improvement in the *personnel* of our vast Merchant Navy, be carried out on a very extended scale. Now, if by such an extended training system you succeed in producing a large additional number of seamen, you introduce a disturbing element into the maritime labour-market which must have the effect of depreciating the rate of wages. But it has been already shown that the wages of seamen have, until a recent date, been lower than those earned by any other class of skilled workmen; and the inference has been drawn that the inferiority in

the quality of seamen has been attributable to that cause. If, on the other hand, you limit the number of boys in training, in strict accordance with the requirements of the Naval Reserve,—and the Liverpool shipowners, who are the warmest and ablest advocates of the training system, have never suggested that we should go further,—then you will fail in producing any appreciable improvement in the efficiency and supply of seamen for the Merchant Service.

Having given my most careful consideration to this question, and having studied the various plans proposed from time to time by Sir Frederick Grey and others, I have arrived at the conclusion that the scheme projected by the Manning Committee, and approved by Sir Frederick Grey, is the only practicable plan. Any scheme for a partial contribution by the Government and the shipowners would break down, because the majority of the shipowners will not contribute voluntarily, and you cannot in fairness extort a contribution under the compulsion of law. The only reliable source to which we can look for pecuniary aid in support of training ships is the public purse; and the State cannot be called upon to expend a sixpence more than it is necessary to lay out in order to provide for the wants of the public service.

The plan of the Manning Commission was, as it is well known, to establish ten school ships, distributed at the principal ports. Each ship was to be capable of receiving 200 boys, 100 of whom were to be nominated by the Admiralty and supported by the State; the remaining 100 were to be day boarders, who were to be maintained at the expense of their friends. The ships were to be moored to a quay, so as to give ready access to the shore. A commencement might be made upon the plan of the Commission by establishing a ship of the class described at a few of the principal ports. One or two might be established at Liverpool, another at Cardiff, another at Cork, another at Glasgow, and one in the Tyne. In each of these ships 100 boarders should be entered under an engagement to join the Naval Reserve. They should be trained, according to the plan of the Commission, for one year, on precisely the same system now adopted on board the "St. Vincent." At sixteen they should go to sea in the Merchant Service; at twenty they should be required to join the Navy for a year, to be trained in gunnery, according to the plan sketched out by Captain Wilson in his recent lecture before this Institution. In each of the school ships there would be vacancies for 100 additional boys, who might be either boarders or day boarders. The fees for the day boarders might be paid by the Education Department. The boarders would be supported by the subscriptions of the merchants and shipowners, or by the contributions of wealthy and benevolent persons, desirous of availing themselves of the facilities, afforded by the Government on behalf of poor boys, in whom they might feel an interest. The number of boys in training in the school ships at Portsmouth and Plymouth should be reduced, so that the aggregate number should not be increased by the establishment of the new training ships at the commercial ports. If the plan succeeded, the number of naval school ships at the commercial ports might be gradually increased.

The recent destruction by fire of the "Warspite" and the "Goliath"

has aroused the public interest in the training ships; and the gallantry and discipline exhibited by the youthful crews have been accepted as a proof that the training they receive is perfect in all respects. The belief has accordingly been gaining ground that the difficulty of manning the Merchant Service satisfactorily can be met by the multiplication of training ships of the same class. In my judgment there could not be a greater mistake, and in that belief I am confirmed by Captain Wilson, and by many other competent authorities, whose opinions I might quote if the time at my disposal permitted. Let us acknowledge with thankfulness the good work that is being done on board these charitable, industrial, or reformatory ships. I wish God speed to the benevolent men, who have sought to rescue hundreds and thousands of little children from the vile associations, in which they have been born, and to bring them up to an honest calling. But let us not suppose that the low morality of our forecastles, which has been so deeply, and, alas! in too many cases so justly, deplored, can be raised by recruiting the Merchant Service from the pauper and criminal classes. We want to draw the great mass of our seamen from pure and untainted sources; and if we wish that our honest and self-supporting artisans should send their sons to sea, we must give them some assurance that they will not be thrown among boys of another class, with whom they would be afraid to allow them to associate on shore.

It has been already said that the training of seamen in school ships is after all an artificial system. The open sea is the only true place for training seamen. Already the greatest difficulty is experience in the Navy in finding ships for sending the boys, trained by the Admiralty, to sea.

I, therefore, venture to suggest a plan for encouraging shipowners to take apprentices under an engagement, at the end of their apprenticeship to serve for a year in the Navy in sea-going ships, according to the plan of Sir Frederick Grey, or in barracks according to the plan of Captain Wilson. These Government aided apprentices should not be entered until the age of 15. At 19 they would be out of their time, and they would be only 20 at the close of their year of service in the Navy. The following scale of bounty to shipowners and apprentices is suggested for discussion. It may be premised that the ships should be of a class adapted for instructing boys in seamanship, the number of boys limited in proportion to the tonnage, and the boys themselves approved by an Officer representing the Admiralty. For every apprentice so selected the shipowners should receive, at the end of the first year, a bonus of 15*l.*, and a further bonus might be paid to the shipowner at the end of the second year of 5*l.* In the third year the apprentice should receive a gratuity of 5*l.*, which would supplement his wages, and be an encouragement to him not to break his indentures. At the end of the fourth year, on joining the Navy, the apprentice should receive a further bonus of 10*l.* The total amount of these payments is 35*l.*, an insignificant sum in comparison with the cost of training a boy in the Navy from his enrolment until he becomes an able seaman. The seamen trained under this system would have been afloat in sea going ships throughout their apprenticeship, and

would only require drill in gunnery, in order to become valuable auxiliaries to the Royal Navy.

The consideration of the condition of our seamen would be imperfect without some allusion to the necessity of establishing a pension fund. In all the other leading maritime states, provisions has been made for the maintenance of seamen in old age and in sickness. The most complete organization for this purpose is to be found in France, where it was established by the great Colbert as a co-ordinate and essential part of his plan for compulsory service in the Navy. The institution has been maintained in its integrity to the present time.

The subject received the most ample consideration from Lord Ellenborough's commission, who most strongly recommended the establishment of a compulsory self-supporting Seamen's Pension Fund. The subject has been incidentally examined by the Manning Commission and Mr. Lindsay's Committee, and the proposals of Lord Ellenborough have received their warmest approbation. It has been calculated that a payment of 1*l.*, a year, commencing at the age of 14, would provide a pension of 12*l.*, a year at the age of 50, of 15*l.*, at the age of 52, and of 18*l.*, a year at the age of 55. In this calculation allowance is made for a considerable number of seceders. The Government possess in the numerous shipping offices the clerical staff necessary for carrying out the recommendations, which have so often been made in favour of a Seamen's Pension Fund.

While I trust that some if not all the suggestions contained in this paper may be approved by the shipowners and the legislature, and produce their anticipated fruits in the amelioration of the condition of our seamen, I am well aware that it is in vain to expect, by any plans for their improvement, that we can neutralize entirely the evil influences under which our seamen, from the nature of their calling, are compelled to live. The sailor boy must quit his home at a tender age, and must pass his youth amid the temptations to be found in every seaport. How much of whatever there is of good in human nature—frail it must be at the best—is derived from home influences.

“We love the precepts for the teacher's sake.”

In proportion as we value these blessings for ourselves, we shall sympathise with the sailor in his moral and social privations; and rejoice that among his class there are to be found so many who have escaped the contaminating influences to which they are exposed.

Having dealt with the case of seamen, I turn to the Officers of the Merchant Service. The Duke of Somerset's Commission, following the unanimous opinion of the witnesses, whom they had examined, spoke in highly favourable terms of the Officers of the Merchant Service. They said that the Board of Trade examinations had exercised a beneficial influence in raising the standard of education, and attainment in the art of navigation, and that the improvement among the Officers offered a bright contrast to the deterioration among the seamen.

None will be found to dispute the general truth of these conclusions. There is reason, however, to believe that in the nautical profession

many may yet be found equally unworthy in character and in knowledge to occupy the important position of a ship master. Several members of the Consular Body, in their replies to the letter of inquiry in 1872, adverted to the deficiencies of the British ship masters, and to their bad conduct on shore. Mr. Gould, in his Report on the British Maritime Service in the Baltic, gives some figures, which show that British shipping is being gradually displaced by the Swedes and Norwegians, and he attributes their superiority in the race, not as it might have been expected, from the general tone of the shipowners, to the faults of the seamen, but rather to the inferiority of our shipmasters. Mr. Gould specially refers to the utter ignorance of foreign languages, displayed by the English, in marked contrast with the German and Scandinavian Officers, all of whom have received a good commercial education, and speak English and probably other languages in addition. Several of the Consuls allude to the insufficiency of the salaries given to Officers of the Merchant Service. Unquestionably ship-masters are underpaid, as compared with persons of equal responsibility on shore, but the remedy lies with the parties to the bargain. The Legislature cannot interfere, and public opinion cannot do much. It is certain that there is immense competition among the more educated men before the mast for promotion to the quarter-deck; and the shipowner has a perfect right to take advantage of any turn of the market in his favour, provided always that the Officers employed are equal to their work. In our own day, as in all former times, the Officers of the Merchant Service have been a mixed and various body, including many gentlemen of high bearing and education, and, at the lower end of the scale, no inconsiderable number, who possess none of the qualifications necessary, even for the most modest command. It is indeed unnecessary to insist on the same standard of excellence in all cases. The value of the ship and of the cargo, and the extent and difficulty of the voyage, must be taken into consideration by the shipowner, in determining the amount of salary which he must give, and the qualifications which he will require in the commander of his ship. Every commander in the Merchant Service cannot be highly paid, but many are not so liberally rewarded as they ought to be. The illiberality of certain ship-owners was severely criticised by Captain Toynbee, in his speech at the Society of Arts in their last session, when he referred to ships of 800 tons in the East India trade, where the masters were receiving only £10 a-month. Even in the best employment every Officer below the rank of Master is badly paid. The expectation of promotion is an inducement to subordinates to serve for years on a small pittance of from £4 to £7 a-month, considerably less in short than the wages of the carpenter or the boatswain, who are working under their orders.

Allowing that the Government cannot do very much to elevate the professional status of the Officers of the Merchant Service, and that it can do nothing to increase their rate of pay, I venture to make one or two suggestions, which I should be glad to see adopted by the departments concerned. The Board of Trade may raise the status, and improve the qualifications of the merchant Officers, by enlarging the

scope of their examinations, and by giving a certificate of a superior grade to Officers, who could pass in one or more languages, in which a certain colloquial facility should be required. To these acquirements, commercial subjects, including, for example, the theory of foreign exchanges, and the elements of commercial law, might be added with advantage. If the good results, which I venture to anticipate, were to follow from the encouragement, thus afforded, to a wider range of study, the Board of Trade might be justified in making the higher certificates, which at first should be the reward of those who passed a voluntary examination, a necessary qualification for the command of any ship exceeding a certain tonnage.

The Admiralty might co-operate in this important work, and render a great service to the country, by requiring all Officers, before they receive commissions in the Reserve, to serve on probation for a year in the Royal Navy. Here again I am only repeating a proposal already made by Captain Wilson. The advantages of such a regulation ought to be mutual. The mercantile Officers would become in some degree familiar with the duties they would be called upon to perform in time of war, and the Admiralty would have an opportunity of testing the qualifications of candidates, before giving them commissions. In future, all Officers before they enter the Reserve, should be required to go through a three months' course of gunnery at Portsmouth; they should receive adequate pay while so employed; and if they failed to make reasonable progress, should be dismissed from the Reserve.

It would be an encouragement to nautical study, and a graceful recognition of the Merchant Service, if a few studentships were founded at the Naval University at Greenwich, which should be opened to competition by all officers, after four years' service at sea as mate or master of a merchant-ship. They should be tenable for one year, and should be of sufficient annual value to cover the necessary expenses of the student, and to give him in addition a sum equivalent to the income, which he would have earned, if he had been following his profession. I assume that each of the studentships would cost the Government about £120 a year. Five might be offered in the first instance, one of which should be reserved for Scotland, and another for Ireland; and the number might be increased if the experiment proved a success.

The good example of the Government might probably find imitators among the merchant princes and shipowners, who would found nautical studentships, just as fellowships were founded by pious and benevolent men in ancient times at Oxford and Cambridge.

It is necessary that I should conclude. Many difficulties in the way of carrying out my latter suggestions may present themselves to the minds of Naval Officers, even though they are sincerely disposed to welcome as comrades and messmates the representatives of the Mercantile Marine. Something, however, must be done to make the resources of our maritime trade in men and ships available for the emergency of war. The maritime armaments of the great continental powers have been developed in such vast proportions, that it is only by the development of our naval strength, that our country can maintain her claim to

rank as a first-rate power. Our fleets cannot, however, be increased without such additions to the estimates, as the country would never tolerate in time of peace. Naval expenditure may be economized by keeping a large proportion of your Officers and men on half-pay or in harbour ships, but a naval force gives a fallacious appearance of strength, unless it be kept in full efficiency by frequent employment afloat. It should, therefore, be the aim of our naval administrators to create a thoroughly reliable reserve in the Merchant Service. The officers and the men of the Reserve must be made sailors in the maritime trade of the country, and they must be trained to the use of arms in the Navy. Once more, if it be true that the condition of the Merchant Service is not in all respects satisfactory; if you want to raise the tone and the professional standing of the merchant Officers, and to improve the seamanship, and to raise the character of their crews, a closer intercourse with the accomplished and high-spirited officers and well-disciplined seamen of the sister service will prove the most effectual means of accomplishing the end in view.

I began with an enumeration of the causes of the alleged deterioration of seamen; I conclude with an enumeration of the remedial measures proposed. They are:—

- (1.) The abolition of the advance notes.
- (2.) The shipowners to be required to allow interest in case of unnecessary delay in paying off their crews.
- (3.) The Government to give a bonus to shipowners for apprentices, trained under suitable conditions, and under engagement to serve for a year in the Navy, and afterwards to join the Reserve.
- (4.) Training ships under the Admiralty to be established at the commercial ports, according to the plan of the Manning Commission.
- (5.) A compulsory self-supporting Seamen's Pension Fund to be established under the management of the Board of Trade and the guarantee of the State.
- (6.) Voluntary examinations in modern languages and commercial subjects to be established for masters and mates; studentships for the officers of the Merchant Service to be founded at Greenwich.
- (7.) A scale of provisions to be prepared by the Board of Trade, and ships bound on long ocean voyages to be required to be provided accordingly.

The CHAIRMAN: Mr. Shaw Lefevre has very kindly offered to give us a few remarks on the subject, and I will ask him to begin.

Mr. SHAW LEFEVRE, M.P.: I presume it is out of kind consideration to my Parliamentary duties, which may call me hence in a few minutes, that you have asked me to lead this discussion. In the presence of so many able and more distinguished persons, I have considerable hesitation in doing so; but at all events, it gives me the opportunity of being the first to thank my friend Mr. Brassey for his extremely interesting and able paper. It shows, as all his works do, that deep study, that fairness and moderation of views, and that sense of public duty which so distinguish him. With most of his premises I most cordially agree. We have talked over the questions together on many occasions, and I think we have worked out some of them together. I agree with him in thinking that there has been great exaggeration in what has been said with regard to the deterioration of

our seamen. Mr. Brassey was good enough to quote from the replies to the circulars which I issued when I was at the Board of Trade five years ago to our Consuls abroad. Those replies might, with great advantage, be compared to replies made to a similar circular issued by the Board of Trade twenty-five years previously, and if you compare those two sets of replies, you will find that many as are the complaints recently made by our Consuls, they were far greater twenty-five years ago. I think without a single exception twenty-five years ago every Consul condemned our sailors in every possible way; but if you look at the replies which have been published in answer to the circular, which I issued three years ago, you will find that though a great number of Consuls speak in very unfavourable terms of our seamen, yet a good many others speak much more favourably. My impression is, therefore, that the seamen have not deteriorated; but I believe public attention has been much more called to the subject, that the seamen have not improved relatively so much as other classes, so that there is still too much reason to complain of their general condition. Seamen we must recollect are somewhat of an international class: they suffer from evils not only at home but abroad, and when we know the condition of things at places like Callao, Quebec, New York, San Francisco, and many other ports where our seamen are brought into contact with influences of the worst character, we cannot be altogether surprised that they have not joined in the general improvement which we see in other classes. Mr. Brassey has also referred to the proportion of foreigners, and I think that he has shown that the relative number of foreigners has not so much increased as people suppose; in fact it has somewhat diminished of late years, and I do not think there is much ground for complaint on that score. Mr. Brassey then went on to speak of the training-ships for boys, and I quite concur in what he has said about the existing training-ships in our mercantile ports. They were formed generally with a double object, the main object being to rescue boys from the streets—what are called the street arabs. Others are reformatory ships, whose object is mainly to bring boys of that class to a somewhat better course of life. In that they have been eminently successful, but they have not been so successful in training boys to the Merchant Service. Captain Wilson has lately pointed out that for the most part these boys when they leave the training-ships are not physically in a condition fitting them to be entered for the Naval Service; and as we may presume that the Merchant Service requires men of equal physical condition to those of the Navy, we may conclude that these boys are not fit for the Merchant Service. My strong impression is, that a very large proportion of the boys that now proceed from these reformatory and training-ships are not really good material for the Merchant Service. At the same time I have no wish to throw any discredit upon those ships. I believe they are doing an extremely good work in training and educating boys from the criminal class to a better state of life, and I wish them every success. Another defect about them is that the boys leave the ship at too early an age. I believe for the most part they are sent from these ships at the age of fifteen. Now all experience shows that the best period for training boys for the sea, whether for the Navy or for marine service, is between fifteen and sixteen: therefore I was glad recently to see in a circular issued by the Admiralty that they make it a condition of the grant towards such boys as enter the third-class Naval Volunteers, that they shall be trained up to the age of sixteen. The period between fifteen and sixteen is really the important age for training boys for sea service, and unless you can keep the boys between those two years, I believe very little good is done. At the same time it must be admitted that there is great difficulty in getting boys between those ages. For the Navy we enter the boys at fifteen, and they remain a year or a year and a quarter on board the training ships, and are then drafted for sea service. But my friend Lord Gilford (whom I see here), will, I have no doubt, tell us that there is no very abundant supply of boys for the Navy. It is by no means easy to get the contingent of boys required for the Naval Service. We require every year something like from 2,500 to 3,000 boys, and I believe at this moment the number is somewhat less; and I have a recollection of the difficulty in getting the adequate number. Then further, these boys who enter at the age of fifteen are paid by the Naval Service *9l.* a year as wages, besides a free kit; and my strong impression is that if we go in for a large system of training boys for the Merchant Service

it will be found necessary, if you wish to retain them between the ages of fifteen and sixteen, to pay them wages. I need hardly say that that will add considerably to the expense of the operation. Whether you will get the boys at all at the late age of fifteen I rather doubt. At that age all the other employments of the country are in competition with you; if you enter at an earlier age you may get them. At thirteen or fourteen I believe you could get them for two if not for three years, as proposed by Mr. Brassey. Therefore, really one of the difficulties to be considered in establishing a system of training boys for the Merchant Service is, what age are you to take the boys at? how long are you to keep them? what conditions are you to make with regard to their future service? and what prospects do you hold out to them of constant and proper employment? On all these points very much might be said. All I can say at present is, that though I have an inclination towards a scheme for training boys to the Merchant Service, I have not yet seen any scheme elaborated which I think will really hold water on those particular points. Mr. Brassey went on further to say, that in his opinion he thought it would be impossible either to get contributions from shipowners or to tax shipowners for the purpose of training boys for the Service, and that the duty and obligation and charge would practically fall on the State. For my part I cannot agree with him. I do not see any more reason for the State paying the whole expense of training boys for the Merchant Service than for paying the expense of training boys for any other trade in the country; and it appears to me to be of the first importance that shipowners should understand that this duty should fall upon them. It may be said that the Naval Service may require it; but I think it is very easy to show that the Naval Service is quite sufficiently provided for irrespective of the boys we may train in this way. I do not intend to go into the discussion that we had in this very place some time ago in regard to the entry of boys for seamen in the Navy; but I showed then that we have in the Navy sufficient men to send all possible ships that we have to sea on the outbreak of war without calling on our Reserves. In addition to that, we have the Coast Guard men, and some four thousand Naval pensioners; but we have also twelve thousand first class Naval Reserve men, and I think Lord Gilford will say that if these men can be obtained at the opening of war with such additional training as might be given in a few weeks or a month, they would be an extremely available class. But now, what is the possibility of the wants of the Navy at the outbreak of a war? I presume nobody supposes that you would hire sailing vessels to send to sea. What we shall want seamen for, will be to send them on board steamers. No doubt we shall have to cover the sea with steamers, carrying one or two guns each; and I presume the extreme number would be every steamer in the Merchant Service of this country. Now, what are the number of able seamen required to man all those steamers? I recollect going into the matter with Mr. Mayo, the Registrar of Seamen, and the calculation we made after careful enquiry was that all the steamers of this country are altogether manned by about 12,000 able seamen. Well, we have 12,000 Naval Reserve men ("not for fighting"), no doubt, but we have 12,000 Reserve men; and supposing we hired all these steamers with their crews, we should be able to place the Naval Reserve men on board, and, as I say, these steamers would not carry more than one or two guns, and a few trained men would be amply sufficient for them. Therefore I do not think there is any such claim upon the Government as would compel us to pay the expense of training boys for the Merchant Service. For my part, I am ready from a Governmental point of view to contribute towards the training of boys for the Merchant Service; but in the main I do think that the charge should fall upon the shipowners of this country. I have often heard it said that the shipowners find very great difficulty in getting men at the present day. I think Mr. Brassey has, to a great extent, shown that that impression has not a true foundation; but I would ask this question, "Where do the yachtmen get their 'men'?" I have often had occasion to ask yachtmen that question. It is a question of wages. They draw their men from a somewhat different class, from the fishermen of this country. The fishermen of this country are rather a higher class of people than the ordinary seamen. They are for the most part accustomed to fore and aft vessels, and are extremely useful for such vessels, and probably would be equally so for steamers; but the owners of yachts induce, by higher wages, some five or six thousand men every year to come from their fishing trade to the yachts. Now, I

would ask whether shipowners, by offering better terms could not get men from the same class? For my part, I believe the question of the supply of the Merchant Service is in the main a question of wages, and if shipowners give sufficient wages, the men will not be wanting.

MR. EDWIN CHADWICK: I wish to observe upon one point of the very able, and, on the whole, most important and satisfactory paper that has been read by Mr. Brassey, the subject of training for the Mercantile Marine. I think, the conclusion which he has formed, and which my honourable friend, Mr. Lefevre, has formed, on the subject of that training, has been confined to the examination of the outcome of the training ships. Now there is experience, which, if it be fairly examined, will be found to be completely conclusive in respect to the outcome of the training in schools on shore, such as, at the Limehouse School, the Greenwich School, and a number of other schools where the training has been given with a mast and a skeleton deck, proving, beyond doubt, that on shore they give them almost all that is requisite for going on board, except their sea legs, heaving the lead, and one or two other matters. If you examine ship captains, you will find that there is very little difference of opinion upon this point. The effect of the training is marked practically in this way—that it is very common, when one of those boys comes on board, for the boatswain to say, "My lad, from what ship did you come?" He answers frequently, "I have been in no ship, I came from a school;" to which the boatswain's reply is, generally, "You lie; you are a deserter." Mr. Brassey, says, that it is very undesirable to train seamen from such polluted sources as the pauper schools. Now, if I were to select any class at all for a good outcome, it would be the orphan children brought up in the district half-time schools, from their infancy, and who have been uncontaminated by any association with adult paupers as in the Union houses, an essential distinction; and if you examine the outcome, and take the experience of people who have had experience of those boys, you will find that they stand in the highest class; there is nothing on board any of the training-ships that will exceed them, of this same class of children. I venture to say that, upon a recent report and examination as to the outcome on board the "Goliath." It was an enquiry made from every ship and place where they had gone, and the report was uniformly good, with exceedingly few exceptions. Now it is exceedingly important to consider these outcomes; because, if you can train children on shore, you can provide a mast and skeleton deck for about £500, and you may train about eight or ten times the number on this method that you do on board ship. I think if that be fairly examined, it will be found to be one of the most cheap and economical ways of providing for an addition to the Mercantile Marine, and you would see in the result that it would be very desirable to have masts and these naval exercises extended throughout all the other ports and all the elementary schools that are there. I want it almost exclusively on sanitary grounds, because it is found that in these schools the naval training is an exceedingly good addition to the gymnastic training. We got a man from the "Excellent," who gave the boys naval training and the exercise of the guns, and altogether it is so valuable an addition to the gymnastics that are requisite for the bodily treatment of these children, that I would recommend its being imported into schools for the simple up-bringing of the children of the wage classes without any reference to any special service; but for civil manual work, as well as for naval and military service. But, in respect of their choice, there is this difficulty of bridging over the time. They usually get them through the training in these shore-schools at about 13, and there is the difficulty of bridging over the time till the 15th year, when they are left to choose for themselves; they are not under obligation to join the Service, but about 70 per cent. of them have hitherto volunteered for the Navy, and whenever they have the opportunity, they volunteer for the Royal Marine. On asking the cause of their volunteering for the Royal Marine, the answer has been almost uniformly: "Because the Mercantile Marine is so dirty and so disorderly." The difference between the two services in sanitary condition is attested by this fact, that the death rate in the Mercantile Marine is about 18 in 1,000, while setting aside accidents in the Royal Marine, exclusive of deaths, in service, and in the home stations, it is not above 6 in 1,000. One great element has been omitted in the consideration of this question—as to the desire of the

shippers themselves to co-operate in this. It is a perfectly notorious fact, that shippers send out crews which would not be sent out but for full insurance. I think more might be said upon this; but I must only challenge the facts as to the sufficiency of the examination upon which the conclusion is based, that training and keeping are adequate for securing the necessary discipline, and are not half so expensive as in the training ships.

Mr. DONALD CURRIE: Sir Hastings Yelverton and Gentlemen,—I had not expected to be called upon to say anything on this subject, although it is one in which every shipowner should take a very deep interest, but I will say, as briefly as possible, a word or two respecting the points brought forward by Mr. Brassey. I do not know any subject which should be more interesting or more easy of settlement to a shipowner than this question of manning the Mercantile Marine; and yet I do not think there is any shipowner quite capable of exactly deciding what ought to be done. It is a very complex question. It has become involved through late agitation and discussion, and it is not yet ripe for settlement upon a proper basis. National interests have to be considered in relation to war, and I advocated last year before the President of the Board of Trade, that our desire was, if possible, to secure interchangeableness between the Royal Navy and the Mercantile Marine. I think it can be accomplished. I think it ought to be accomplished. The Mercantile sailor is just as courageous and ready for his work—if he only knew what to do—as the seaman of the Royal Navy; but he must be trained for the qualities required in war, and the question at present is this: how is the interest of the shipowner since the abolition of the Navigation Laws, and with the competition to which he is exposed, to be brought into harmony with the national requirements, which should compel from him a ready acquiescence in anything that is for the national good? It is said, for example, Why should not the wages of A.B.'s in the fore-castle be paid according to their ability? I think it would be nearly impossible to settle that, because you have no rule of judging before a man goes to sea, what his qualities are. The question is, will a man consent to go on the condition that the captain shall, upon his return, gauge his value? That will be a question of contract, and a difficult one. Again, if you carry out the principle involved in the suggestion of classing men as A.B.'s upon certificates, you virtually establish a trades union, and you play into the hands of those who have advocated this trades union. At the time certificated engineers were put into ships the great difficulty pointed out by steam-shipowners to the Board of Trade was this: "We cannot get qualified men with certificates," but the Board of Trade told us that the Amalgamated Society of Engineers would get us plenty. At that time we had to send the worst of engineers, often drunken fellows, on board because they held certificates; so if you say now: "We will only take four-year A.B.'s," you will commence by limiting the already small supply of seamen available for our ships. This means beginning at the wrong end. I think the great thing is to hold out inducements to the sailors to behave themselves, and by the encouragement of the old and friendly relationship between the sailor and the shipowner. That, however, is a matter not to be settled by legislation, though there are certain legislative means by which, perhaps, you can help to arrive at that end. I have had Masters of the Royal Navy and Captains of frigates applying for command of one of our steamers; but there is a natural feeling among the Mercantile Marine that they should have nothing to do with naval men, while naval men do not care to associate with the Mercantile Marine officers. Hence there is a want of sympathy between the one and the other, which I would like to get done away with by making them interchangeable in early youth. What is the inducement to a sailor to go into a merchant ship? Very little as far as I can see. Three days ago I engaged a first-rate chief officer—as good a man as anybody could find; and having no immediate place for him as first officer, I told him I could make him second officer. He agreed to it, but afterwards he came and told me that, as he lived in Scotland, and had a large family, he could not afford to live here, and I found that, after twelve years at sea, that man has scarcely enough to live on. Hence the question arises in my mind, What can be done to raise the status and the pay of officers, and the status and the pay of men? The question is before the Central Committee of Shipowners for consideration. There are six or seven plans, one finds favour very much in the shape

put by Mr. Brassey, which will secure the advantage of proper early education and enlightenment and a proper tone, and which, getting them into the Navy, and the Mercantile Marine afterwards, will provide some resource in their old age; for very few sailors go to sea after they are fifty, and I want to know where they go. The way to do it, perhaps, will be to arrange some system of pension with a proper early training; and that can only be got if you induce the sailor to see that he can get something on board the ship. I regretted extremely at the time that you reduced the Coastguard Service. I do not know anything more deplorable than a case such as that of the "Deutschland," and other cases where lifeboats, which might have saved many lives, have not been launched, or have not been established, when they would have been of great service under the Coastguard. If we had these Coastguard men ready for war, they would be useful for times of peace: and it was false economy which discharged so many. Mr. Shaw-Lefevre asked, Why do yachtsmen get such good men? Every one knows that yachtsmen are drawn from the fishing vessels when they are idle. Then there are able steady men who work in the yachts in the summer, making short voyages in the spring and autumn in Canadian and other vessels, which are shut up in the winter. Who was the Captain of the "Cambria," which won the race across the Atlantic? He was the Captain of one of the Canadian clippers. I have seen steamers go to sea with a crew of ninety men and not a drunken man, and amongst them there would be perhaps twenty Naval Reserve men; when any earnest shipowner tries to retain them, they do not want it; they won't be engaged for a second trip. I know men now in command of ships, who were carpenters seven or eight years ago. There is no falling-off in the raw material, but there is a falling-off somehow or another, and I think it is very much owing to the increase of so many steamers suddenly, and to the competition throughout the whole world. We should deliberately consider what is best for the national interests and how they can be secured through the Mercantile Marine, and we owe much to Mr. Brassey for the care and judgment he has shown in the maturing of a plan to secure this development in the best way in the long run.

Captain Sir GEORGE BIDDLECOMBE, R.N.: The gentleman on my right made some observation with reference to the education of boys for the sea by having a vessel established on shore. Well, I have had a very long turn at sea life, and I do not know how it is possible to make boys available for sea service by preparing them on shore. I am quite sure of that; and, therefore, I feel confident that no other system, if we are to introduce boys into the Mercantile Marine, will answer, than that of establishing vessels at our various ports in England and Ireland. I am very glad to see that the Government have lately wisely adopted an arrangement by which boys, who are found competent to join the Royal Navy from such vessels, shall receive a certain sum of money, that is, the training ships will do so, which will assist in supporting them, because, for a long time past, these Institutions have been working with very great difficulty. I speak of the "Chichester," the "Arethusa," and the vessel at Liverpool. They have been working with very great difficulty by getting contributions from their friends to support these vessels, and they have turned out a very large number of boys, some of whom have been proved, on being sent to Her Majesty's ships, to be quite equal to those boys that have been trained on board the "Implacable," and other ships of the Navy. Now if we can train in vessels of the character that I have described boys who are efficient and can be sent into the Navy for £25, while we are training them on board our own ships at an expense of £40, £50, or £60, I think we ought to encourage the establishment of these vessels in every port in England and Ireland. Some other remarks have been made to-day which, perhaps, it is unnecessary for me to touch upon. There are so many naval men here of great experience, that it would be unworthy of me to make any remarks. Still, I would just touch upon the subject of our British seamen. I see three or four Officers here (under one or two of whom I had the honour of serving many years ago), one an Admiral who, when he commissioned a frigate, had the greatest difficulty in getting men. And what were the men we took on board our ship? I am speaking of 1838. Why, two-thirds were useless men, until we took them to sea and instructed them. Therefore, we must not conceive that in days gone by we had all these seamen which we now look forward to, and suppose we are to

get them at once, for in 1840 there was very great difficulty in procuring men for the Navy, which induced the Government ultimately to train boys, and have continuous service seamen. I happen myself to have served in the Mercantile Marine of this country for many years. It is quite true that our mercantile seamen in my early days were the best seamen in the world, and I believe these Officers will tell you that the men we received from the Mercantile Marine were the best seamen we got on board ship, and they did their duty in a most satisfactory manner after being properly encouraged. But a seaman in the Navy now is a very different man to what he was forty years ago. In 1834, the late Admiral Smart, commanding the "Satellite," was the first man who introduced the system of exercising seamen as small arm men, and the first employment of sailors on shore for *soldiers' service* was only in 1847; and the duties which seamen have now to perform in comparison with what they were forty years ago are so various that the seamen that we had in those days from the Mercantile Marine would have been totally useless now without twelve months' exercise. I therefore think we cannot do better than go on in the old system of training men, not only for the Mercantile Marine but for the Navy; and if we can only arrange in any way to work the two together, so that the men shall serve a certain period of time in connection with the Navy as well as in the Mercantile Marine, then I think we shall attain a good object.

Colonel Lord WAVENEY: I have neither professional knowledge nor experience, but I rise to supply a very remarkable omission that I have observed throughout the whole of this debate, and that is with regard to the supply of seamen for the Marine Service and for the Royal Navy, from coasts on which, I believe, a sea break which would try the Officers, seamen, and ships of Her Majesty's Service, and therefore, according to all analogy, is likely to produce seamen. I speak of the supply that may be expected from Ireland and her ports. It does not appear to have been present to the recollection of gentlemen that, at this moment, there is a ship, which has been lying for some time in the Lough of Belfast, which has trained a considerable number of young men drawn from the sources on which, some discredit,—but I think unreasonable discredit—has been cast, those who have been rescued from a life of poverty or a life of crime, and also those who have taken shelter in Union Houses. I think I recollect that there was formerly a saying in the Royal Navy, that no Irish seamen were to be found, except between Cork Harbour and the Old Head of Kinsale. I know not how far that may be true, but I think the establishment of training-ships in the estuary of the Shannon, in the Harbour of Cork, in Belfast Lough, and other parts of the Irish seas, will be of great advantage, and I would recommend it to the attention of Mr. Brassey, who has given us such an excellent exposition of these matters, as a subject well worthy of consideration. The maritime enterprise of Ireland is not so extensive, but it reaches as far as the maritime enterprise of other parts of the country, and I hope that on a future occasion we shall hear, not simply of one training-ship in the harbours of Ireland, but three, and perhaps four.

Captain FIELD, R.N.: I should like to offer a remark or two. I have listened with much pleasure to the lecture given by Mr. Brassey, and we cannot be too thankful that we have a few civilians in the House of Commons who bring their minds to bear upon naval questions. This is one worthy of the attention of statesmen; but no statesman as yet has attempted to grapple with it. I do not agree with much that has fallen from him, though there was much also that I was delighted to listen to. I do not agree that it is the duty of the State to pay one single farthing towards finding seamen for the Merchant Service, taking it as a question by itself. It can only be defended on one principle—that it should tend to give a supply of men to the Navy in times of emergency. On that principle alone it is defensible.

Mr. BRASSEY: I said (p. 119), "The State cannot be called upon to expend a sixpence more than it is necessary to lay out in order to provide for the wants of the public service." I quite agree with the gallant gentleman.

Captain FIELD: But you speak of giving the shipowner a bonus to the extent of £35 for taking boys out of these training-ships, or as apprentices.

Mr. BRASSEY: To serve for a year in the Navy, and be under perpetual obligation to serve when called upon.

Captain FIELD: Even that I object to. I think that such payments are unnece-

nary and indefensible. If they are unnecessary, they cannot be justified, and I think I shall be able to show they are unnecessary. I quite agree with the extension of the training ship system round the coast, and I think it is the only proper system for us to foster; but I see no necessity for the Government to make special grants for such a purpose. We need but an extension of our present educational system. We need but to make Government capitation grants, as we do to our ordinary national schools, and we could also call upon parents to pay ordinary school fees, as they do now in the national schools. With these fees, and a Government grant, and voluntary subscriptions, we should be able to have a nautical system of education, as well as the land system, for the children of this country. I am confident that hundreds and thousands of parents would be only too glad to send their children to such schools, if they were fostered by the Government. There would be no need for the Government to pay from time to time the shipowners to take children out of such schools. The managers of such schools have no difficulty now in placing their boys in any ships. I do not agree with Mr. Brassey in his qualified approval of the plan of training lads by an artificial system. Why, the life at sea is an artificial life; and in order to induce persons to lead an artificial life, they require an artificial training. I do not agree with the remarks depreciatory of taking children from the pauper class and the criminal class. I hold that children cannot be criminals in the true sense of the word. I hold that children are pure and untainted as a rule, and if there is any taint resting upon them, it is in consequence of the surrounding conditions of their lives; but if you train them in these ships, they will be trained as God-fearing citizens, and good seamen for the State. I say with 240,000 pauper children, such as we have now, we would do well and act wisely to encourage some of them to enter our training ships; and I am satisfied that in the pauper schools of this country we should find hundreds of children who would be only too anxious to submit to be trained in these training ships preparatory to a sea life. I think that if a system of training ships, or training schools, in our various harbours and ports were established, in return for the Government grant, the State would have a right to lay down certain conditions just as in the Navy they make the parents on behalf of the children engage that the child shall serve ten years in the Navy. Why should not the State make the same rule with regard to training ships, and take the assent of the child by its signature, and compel the parents to agree that the child shall serve for ten years from the age of 18 in the Naval Reserve. I do not care for the one year service in the Navy; I do not care one straw for that; but bind them at eighteen years of age, and let them receive some small retainer,—a matter of detail, easily settled by the authorities. With that provision, and knowing that the shipowners would only be too anxious to get such lads, there would be no necessity for paying the shipowners a premium, but vast numbers of lads would be growing up for the Navy in the Naval Reserve. I do not agree with Mr. Shaw-Lefevre with regard to the number of men we should require in time of war. I am confident that ten times the number he stated would be required. It is absurd to think that 12,000 men would be sufficient to man the steamers and fight them, and scour the seas in time of war. 12,000 would be of no service whatever to fight the steamers when armed with guns (Mr. Lefevre said A.B.'s). I was surprised to find Mr. Brassey state—but I presume he has good foundation for the statement—that the number of foreign seamen has diminished. I thought that was one of the evils which led to the diminution of the rate of wages, because there was such a large element of foreigners in the service; but I am bound to accept his statement if he gives it. I can only speak practically. I live where seamen are constantly charged before me, as a magistrate, with mutiny and refusing to do duty on the high seas. Only last week a whole ship's crew of Greeks were charged before me with refusing to do duty, and there was not a single Englishman, except the officers, in the ship. It was the most difficult question I ever had to deal with in my life. There was not one man who could speak proper English, but there was one who could speak broken English, and that man had committed the greatest offence. If I had sent to Oxford to get a professor of Greek, he could not have understood them; but before charging the man who could speak the broken English, I spoke to him a few kind words in order to induce him to fall in with my views. I then swore him in as an interpreter, and made him interpret the evidence against the others, and interpret

their answers back to me. Then having heard the minor case, we heard the case against himself. That is a curious illustration, showing that our ships are often manned with foreign seamen, and it is a terrible condition for Captains to have such crews. However, I am only too thankful to Mr. Brassey and others who take up this question. Unfortunately we have not enough naval men in the House of Commons to take it up. That is the proper place in which to thrash it out, but some good may follow from discussions in this theatre, if those in authority will take notice of them.

Admiral OMMANNEY, O.B., F.R.S.: With regard to the employment of foreigners, I should like to mention one glaring instance that came before my observation last year. I took passage in a ship of a very influential company, which received a very large subsidy from the English Government. The crew of the ship, including stokers, numbered about 60 hands, every one of whom were either Italians or Greeks. On enquiry as to the reason for not employing British seamen, I was informed that the foreigners proved to be more sober.

MR. GREAVES: Mr. Chairman and Gentlemen,—There must be an extraordinary apathy in the Merchant Service at the present time when year after year meetings of this sort are held, and but very rarely does a shipmaster from the Mercantile Marine come forward. I suppose the Mercantile Marine is demoralised by the presence of foreigners. For years I have been watching these things. Can you suppose there is any honest pride in the young Englishman of the present day in going into the Mercantile Marine, when they find confronting them in every grade of life a foreigner who is more often preferred because he will go cheaper, or appears to have manners less ferocious in independence than the Englishman, and is more suave? Do you suppose that boys will be recommended to go to sea by their parents, or counselled to do so by their friends, when they know this? No, Sir; I always say to boys, "Remember this, that so soon as ever you have made yourself fit and capable to be brought on to the quarter-deck, and go through your grades, in every grade that you go through, you will find yourself confronted with a foreigner who is equally esteemed, and in many cases by a low class of shipowners, much more esteemed than you are." It is a difficult question, but the difficulty began at the time that the Merchant Shipping Act of 1854 was brought in. Those who brought in that Act might have looked down the vista of time and seen the whole of the alterations in the Statute Book as they now stand, as a necessary consequence of their beginning *de novo* without knowing what they were going to begin about. I want to say something about the status of the masters in merchant ships, because at the conclusion of the session of the House of Commons last year, Mr. Brassey made some allusion to bringing forward some measure to improve the status of shipmasters. Now I will ask, how are you going to improve the status of the shipmaster, *ab extra* or *ab intra*? You cannot do it *ab extra*, but you can do it *ab intra*, and almost by a stroke of the pen. I contend this, that the whole system of the education of Officers in the Mercantile Marine at the present moment is as thoroughly upside down as it would be possible for the ingenuity of a fiend to make it. It has been decided that we shall all pass examinations, but it has never been decided that we should be educated upon those first principles that make the education almost a matter of pastime,—of pastime almost to the youth, but certainly a pastime to the up-grown man. We are examined upon what? Upon rules? Do we know the reason of our rules? Do we know anything about spherical geometry? Do we know anything about plane geometry, or trigonometry? Can we tell the why and the wherefore, or the because, that lies at the back of the rule, and makes the rule a rule? You shall test it in this way. You shall collect the whole of those in this country who are engaged in teaching navigation, and you shall take the gentleman and examine him first, who is the inventor of the sphereograph and ask him how they set about the education of men? Thirty shillings is paid by a smart young fellow who thinks his arithmetic was pretty good when he was young. He is ground through the rules for second mate; he is coached over and over again, and he goes up and passes. For 10s. or 15s. more he can be ground at the end of another voyage for *only* mate; for 10s. or 20s., he can then get all the rules for passing for mate; and then, at his leisure, he can go on grinding to pass his examination for Master; and, if you take him the day after he passes his examination for Master, and tell him, "I

"do not want any of these calculations worked out with those niceties that have "been impressed upon you, but will you tell me the why and the wherefore that "lies at the back of the rule, and makes the rule a rule," he cannot do so. Now boys learn that at the Blue Coat School. Last year I was down at the East End of London with two Officers belonging to one of the oldest and most honoured firms in this country. Naturally we began to talk on this subject, and we talked much in this way. The elder, the chief Officer, a splendid fellow, said, "There, if I had "been educated like that man," pointing to the second Officer, "I should be ten "times the man I am ;" and he certainly looked all over a man. "But," he said, "the difference between us is this. He was educated at the Blue Coat School: he "chose to go to sea; he got 25 guineas and a watch; and only the other day he "went back to that school, after being away five years, and passed his examination "with credit, and got 25 guineas more; but I was weaned upon rules, and brought "up on rules, and now the whole effort of my life is to find out why the rule is a "rule." As Mr. Lindsey says, in the fourth volume of his book, owners are sorely in want of men who have had their minds opened by education, so as to be fit and honourable representatives of them in foreign countries, and able to conduct their business properly; and one of the most difficult things that a shipmaster has to do in the present day, though he has taken his ship all round the world, is to sail through the difficulties that beset him. We have initiated training-schools for the seamen of all the world, and now we are going to initiate training ships for ourselves. That is upside down, and we say we are going to educate those boys as a matter of benevolence, when we ought to say, we are doing our duty to our neighbour as solemnly as we can that we may do our duty to our God. Whether it is better to have ships or training establishments on shore is a matter that will settle itself. What we want is to redeem these poor gutter-snipes who otherwise must go to prison for things which are regarded as crimes in them, but which are never mentioned in a well-behaved house. One half of them do not know better; but these are God's seedlings, and it is our business to educate them, and they will go by a natural process into the Mercantile Marine, or the Navy, or some other industry; but do you think it is rational to expect them and their parents to sit down and give a written obligation that at the end of a certain time they are going to pay you back by a number of years' service? Do you think you can ask any boy of 16 or 18 to make an agreement to pay back in time of service the value of the education he has got? Why, the very boys whom we get into the Navy at 18, when they come to man's estate, see perfectly well that the bargain, from their point of view, does not sit fair and square upon their shoulders, and they leave. How is the British Merchant Service going to afford you anything like a supply of seamen when that service does not rear its own? How do you suppose the British Mercantile Marine is going to thrive when there is such a large body of foreigners of all nations demoralising them? There was a time when this was a country; now it is a shop. Well, if that is the case, then abandon all these discussions; do not let us have any more meetings of this sort. Say what you are going to do, and do it. If the State, as I contend, has a right to the service of every man in the Merchant Service, let us have some sensible way of combining the two, no empirical ideas, nothing of that sort; but you will find that on board a merchant ship—and I, as a master of a merchant ship, know them fore and aft—our men have no sympathy with the Navy, because they are now a totally different class of men from those I lived with in the fore-castle in 1834 or 1835. There is no similarity at all. Why, on board the last ship but one I had, we could talk eight languages among 27 men; no matter what you said, or what language you used, so long as you gave the necessary pantomime. We have heard a good deal about provisions in the Merchant Service being bad, and I have seen a considerable quantity, and perhaps tasted it. I will ask you, how is it a thousand barrels of meat, condemned for the Royal Naval Service, are passed out through the ship chandlers, provision merchants, and so on, and find their way on board merchant ships? Only the other day, a young friend of mine told me that he was lying in Buenos Ayres, and, when the chief officer had gone ashore, they took the opportunity of calling alongside a gunboat there and asking the Commander to send a Lieutenant on board to examine their food, and the Lieutenant came on board and

condemned the whole of the stores, and it came out of one of Her Majesty's yards. Now, with regard to the question of apprenticeship, it is said that it is impossible to re-enact the law making apprenticeship compulsory, as though we could not take two steps backward with the view of making a bold spring forward. I do not see why every sailing ship should not be obliged to take a certain number of apprentices for a certain period, according to her tonnage. The difficulty is nothing if you will but do it; but if you go round about and talk all over this country about it, everybody has a private lion in their path, which they decline to go by on any consideration whatever, though they will go over and look at their neighbour's lion. There is another reason why foreigners ought not to be placed in command of our ships. A ship is an integral part of our Empire. The master is a man *under* authority; the Board of Trade sits pretty hard upon him; but he says to this man, "Go," and he goeth; and I say that such a man ought to be a son of the soil. I say that every foreigner whom you permit to stand under your flag, putting your laws in force against his ship's company, is occupying the place of a son of the soil; and in his place there is a son of the soil walking about who is disaffected by what passes around him, and he does not join the Royal Naval Service and make it that bully service which it ought to be. You have lost all the *esprit de corps* out of the Service, not because men are less honourable than they were 45 years ago when we swept the sea, but simply because you have done nothing at all to foster it, but everything deliberately to kill it. At this present moment the two services are separated, and one difficulty that you have is this: you do not hear the truth. You have Royal Commissions, and Special Commissions, and Committees, and you get all the most respectable men from all the great employs to give evidence. Now, you will find that the men in the American, the Canadian, the West Indian, the Pacific lines, know nothing about the Merchant Service. I was in command in the West Indian mail for some years, and in fulfilment of our duties in carrying out our daily walk in life, we hardly came in contact with anybody except our brother officers, and a class of passengers of the highest respectability, from whom we could learn by conversation at the table that which we never learned before. Such men have no sympathy for the Merchant Service, and they really do look down on the Merchant Service. I beg their pardon, they do not look down; they look over it. They do not know our wants, our troubles, and the difficulties that exist now between the master and the owner. We cease now to enjoy the confidence of our owners. The telegraph does all the work. We are but the bell-wether to take our ship across the sea and back again; but if we have to be the lawyer of our ships, to instruct counsel, and to do the whole thing from beginning to end, so as to be conscientious and good servants to our owners, there is the position of difficulty, and that is where we find that we are always behind hand. I do not presume to go into the question of the proportion of foreigners to Englishmen, but I can say this, that it is no use to introduce decimals into those proportions. Decimals do not belong to these things. We are practical men. One more or one less as the years vary one against the other, is not two chucks of a brass farthing in the argument. The Englishman is deteriorated; you cannot find him in the quality, you cannot find him in the physical stamina, and you cannot find him in the ability. In fact, what we used to call A.B.'s are gone out of the Merchant Service, because the Navy Reserve has got the *élite* of all the men, and, if you take all the best men out of all the steamers, who is going to lay out the coal to make all those steamers useful? There is a practical way of looking at these things, and, if we are to be fostered,—grand-mothered, I believe, is the proper phrase now,—pray let it be done in an out-and-out practical spirit.¹

¹ The present system of legislating for the *British Merchant Service* is the miserable system of working tide's works without even taking "*the young of the flood*" close in shore, and then standing boldly out and crossing the body of the flood stream so as to make "a tide and half tide," and so long as this style of legislating for the greatest industry in the world obtains, so long will all our difficulties continue to increase. We are in a most critical position, the eyes of our competitors—of all the world—are upon us; and if we are not recalled from our present condition of fatuous and judicial delusion, the finale must be the entire collapse of this nation. Trade and

Lord ESLINGTON, M.P. : I will trespass, for a few moments, on a ground that will commend itself to the hearts of everybody here. If there is one feeling stronger than another in the breast of every Englishman, and I hope every Englishwoman also, it is that of justice, and I wish to be allowed to say one word in justice to foreign seamen, because I have this morning had an opportunity of conversing with a man who probably knows this subject as well as or better than any other man at this moment in England. I shall not mention any names, but some friends here, who know the shipping interest, will recognise whom I mean. He has been engaged in the port of Liverpool—a very good scene for such labours—upon a close inquiry, for four years, into the condition of the Merchant Service. Therefore, when I state him as my authority, it is no mean authority. Now, I am going to state a fact which he told me, which no doubt will startle a good many gentlemen here present. There are, making all deductions, not more than 40,000 able seamen in the Merchant Service of this country. Out of the 160,000 or 170,000 British seamen employed in ships clearing and entering British ports, there are not more than 40,000 A.B.'s that are *thoroughly able seamen*! And how many of those able seamen does this meeting suppose are foreigners? Not less than 15,000! That is a fact so remarkable that I think it will startle a great many persons who hear it. But let us follow that out a moment, and observe our position. First of all let me say, in justice to the foreigner whose character has been rather lightly spoken of to-day, that I am in a position to state, without fear of contradiction, that some of the best seamen in the Merchant Service at this moment—I say it as an Englishman, with sorrow, but with truth—are foreigners, and those men are drawn from Norway, Sweden, Denmark, and Germany. Now, we know that the character of those men is very like our own, and they improve upon our character, because they are more docile, and more obedient, and more loyal to their superiors. That is a remark that I believe is a correct one. But now look at the position that we should be placed in, supposing a sudden outbreak of war were to occur, and we have had bitter experience, not in this country, but in Europe, of what an outbreak of war means. It is a sudden and a sharp blow. Supposing a war, on any large scale, were to break out, we should probably lose at once something like 15,000 able seamen, because they are foreigners. Well, then, I come to the point my honourable friend has pressed upon us, and it is an official point which I have often heard in the House of Commons pressed, with some power and much authority, by persons in high official situations. They talk very much, and rather big, about having 12,000 Naval Reserve. Now, I want to ask any First Lord of the Admiralty, or anyone connected with the Admiralty, how many of those men do they suppose they can get on a sudden outbreak of war? I do not believe they would get more than one-third of those men. They might get 4,000, and think themselves very lucky if they got them. But then, if we are to lose something near to 15,000 able seamen—foreigners—and we are only to command, on a sudden outbreak of war, the services of 4,000 Naval Reserve men, why, our position is a very serious one. You have not got, to start with, above 40,000 altogether, and you have got the whole commerce of this country to carry on, and at the same time you have to form the first line of defence against any combination of naval power that you may have to meet. It is an extraordinary thing to me that we are asked to vote vast sums of money, year by year, and expensive schemes are presented to us of mobilization of forces, and formation of camps, and fortifications to lock up—God knows—how many thousands of our troops, but the question of our Naval Militia seems to me never to enter into the minds of our legislators. We have gone on, for years, upon Bonaparte's motto, which is the falsest in the world, "*Nous ne faisons rien nous laissons faire.*" To trust the defence of these islands to such a maxim as that seems to me the height of folly. We must take

commence a means to national strength, and by these the nation is to be maintained; but if the nation is to be legislated for, as if our sole ambition is to be a shop, governed by a sliding and descending scale of *conventional honesty*, then our doom is already written. In conclusion, we have had and enjoyed the prestige of the past solely because we are the trustees of the future and yet unborn generations. What if we have betrayed this great National Trust?

some step for the comprehensive organization of our Naval Militia. I believe that is the first duty of our statesmen, but I have not the weight or authority to say what the exact form that it should take should be. I augur well, however, from the efforts of such men as my honourable friend, and these public discussions, which, I trust, will awaken the mind of the country to the vital importance of this subject. I will only ask leave to say one more word. We have heard a great deal about the demoralisation of the seamen. I have attended to this subject a good many years; I do not pretend to be an authority, because I have not the means of becoming so, but by constant attention you must learn something, and I do not believe that, in themselves, the seamen are one bit worse, but probably rather better, than they were; but there is a system of engaging and discharging seamen in this country which has been in practice for a long time, and which is most detrimental to discipline. I allude to the engagement of the crews at the shipping office, and I will tell, in two words, what I believe to be at the bottom of a good deal of that feeling, not of disloyalty, but of disrespect and disregard for their officers, which is fatal to discipline, and which is engendered and fostered by that system. The seamen are not often very highly educated men, or men of the world, although they travel a good deal, and they have a sort of idea in their minds that they owe a double allegiance, to the shipowner, in the first place, and to the shipping-master, who is a Board of Trade officer, in the next place. That system of engaging crews under the control and superintendence of the Board of Trade official, which the shipping-master really is, tends to produce that feeling, and tends, moreover, to prevent the master having the opportunity of making the acquaintance of his crew before he goes to sea. I believe that that is a most mischievous system for the country, because unless you can bring them into relationship with one another, it is impossible to expect that those cordial relations which should exist, will exist between them. They may form themselves in the course of a long voyage, but then there is a system pursued which is very destructive to discipline, and that is the recording of the offences and the reading them out from the log to the seamen, however petty the offences may be. That causes, in his mind a rankling feeling of antipathy to his officer, knowing that he will be punished or fined when he gets on shore. That is a very bad system. I won't detain you longer, but I think if this question of the shipping office is really looked into, you will find it was a very great mistake to supersede, even for the convenience afforded by the shipping-office, the old system of engaging the crews under the responsibility of the master, as he chose, some few days before the ship sailed.

Mr. CORRY: I do not intend to make any observations at this late stage of the proceedings, but I wish to propose that this very interesting discussion be adjourned. I think there are a great many gentlemen who would like to express their views on the subject. We have heard some very able speeches, and some very different expressions of opinion, and I think it might perhaps be an advantage if this subject were still further discussed. If it is the will of the meeting, I should move that this discussion be adjourned.

The motion having been seconded by Captain Pim, R.N., with Mr. Brassey's acquiescence, the meeting was adjourned to Thursday, 24th instant, at three o'clock.

The CHAIRMAN: Before we separate, I am sure you will join with me in thanking Mr. Brassey for his very interesting lecture.

ADJOURNED DISCUSSION.

Thursday, February 24th, 1876.

ADMIRAL SIR HASTINGS R. YELVERTON, G.C.B., in the Chair.

MR. CORRY: Sir Hastings Yelverton, Ladies, and Gentlemen: When I moved the adjournment of this debate, I was scarcely aware of the responsibility it devolved upon me, but still, as a practical shipowner and as one who has had considerable experience on the question before us, I may be allowed to make a few remarks. I have listened with very much pleasure indeed to Mr. Brassey's able, moderate, and suggestive paper, and with many of his suggestions I most heartily agree, yet to some I must take exception. Briefly alluding to some of the principal features of his paper, the first point that struck me was this, he rather doubted whether our sailors had deteriorated as a body. I think those who have had practical experience will admit that as a class they have deteriorated. I will not deny that, perhaps at the present time there are as many good sailors as there were twenty years ago, but there are certainly twice as many bad ones. Looking at the rapid progress of our trade, it was scarcely possible that the quality could have been kept up to the standard. Now, a great many reasons can be urged why sailors have deteriorated; one reason is that steamers employ a large number of seamen, but do not make sailors. Another reason is, our ships are now fitted in a different way to what they were years ago, in fact, the whole study of the shipowner is how to dispense with what we call skilled labour, that is to do as much work on deck as we can, and to render ourselves as much as possible independent of that skilled labour which we cannot always obtain. This answers the purpose to a certain extent, but when any emergency or any accident occurs we find ourselves at a great loss. Mr. Brassey referred to the fact that a fewer number of men were now employed to man a given amount of registered tonnage of shipping than formerly, and that this proved that the quality of the men cannot have deteriorated. This argument, however, falls through, when we consider that ships are now of a very much larger class than formerly, and require fewer men comparatively to man them. Apart from this, the superiority in fitting of the modern class of ship would fully account for the difference he refers to. While claiming that sailors are pretty much as they were formerly, he thinks, and we all think and hope, that some means may be devised for improving their condition, and a number of the suggestions he threw out are deserving of our best attention. He refers to the want of encouragement which has hitherto existed for any special exertion on the part of the sailor and the insufficiency of pay. He acknowledges that this last defect has been in a measure remedied, and that the pay is now as much in proportion as in other trades, especially taking into account the facilities of learning the trade, if you may call it one; it is scarcely so now, that is, there are so many who go into it, who have not gone through the preparatory training requisite to make good seamen. Mr. Brassey also referred to the advance notes. This is a very difficult question, and one which has had the careful attention of our General Shipowners' Committee, and is a subject on which I should like to say a few words. We all deplore the abuses which he described, but I think the remedy might be in many cases worse than the disease. It was not a shipowner's measure, it was designed purely for the benefit of the sailor. The shipowner would much prefer to give no advance, and would be willing to give higher wages to dispense with advance, but we find we cannot obtain sailors without it. Perhaps the most practical way would be gradually to reduce the amount from a month to half a month's advance, till the seamen are trained to more provident habits, as now they must have something to start with. Besides, if

you do not give an advance, you must introduce a very objectionable feature on board your ships, namely, the truck system, which has a great many abuses connected with it. However, I think the last defect to which Mr. Brassey referred, was the most important one, that is the want of systematic training for our sailors. The great bulk of our sailors are not trained, or at least the training is of such a slight character that you can scarcely call it training at all. After being perhaps a year and a half in a coaster, they join our ships as A.B.'s. Our captains, of course, know that these are not competent A.B.'s, but still they are all so much alike that it is difficult to discriminate among them, I will give you an instance in point. I had a ship of 1,800 tons lately arrive at Calcutta, the captain wrote to me with reference to her, and he said, "With regard to the crew, they are very willing and are fairly able to make and take in sail, but I can only find four or five men out of the whole crew competent to steer the ship." (She carries a crew of forty men, all told.) Now this ship is remarkably easily steered and has all the best appliances for steering. This will show you that the quality is certainly not what we would like to see. One of the remedies Mr. Brassey proposes is the classification of seamen. This, at first sight, looks very well indeed, but I think, as was pointed out at the last meeting, it opens up a very dangerous question, that is the question of Trades' Unions, and all who have had experience of Trades' Unions, would be very sorry to see anything of the kind introduced at sea. We have enough of discomforts and annoyances without having this system introduced in our ships. We can very well understand, if the ships were ready for sea, the Trades' Unions might have it in their power to stop the ship and make their own terms, and therefore, while it looks well, the dangers are so great that shipowners as a body would fight shy of it. With regard to discharge, the discharge note should be a certificate of classification and our captains are to blame that it is not more so. Of course any one will take seamen who have good discharges for a number of years, and some captains will only take men who have good discharges, and I think this is the right track to go on. If a man cannot produce a discharge it is a sure sign that there is something wrong about him. I have a case in point. I had a ship which lately went down to Gravesend with one of the crew deficient, and I was surprised to find the captain refusing to ship a powerful looking man who presented himself, simply because he had no discharge. The consequence was he had to take two, because the men who had discharges were not up to the mark in *physique*.

A suggestion was thrown out by Mr. Brassey that we should retain picked seamen while in port. I think that is scarcely practicable, at least in sailing ships after long voyages. I know that while in port they won't stay with us, and if they join a week or two before the time, as we sometimes allow them to do, they are comparatively useless, as the deck men, who are trades unionists, will not work with them. Another point he brought out was the personal intercourse of the owners with the seamen. Now, I cannot see very well how that can be accomplished. We, of course, as he well knows, do not take cruises with our ships, and the only intercourses we may have is in occasionally going down to Gravesend, when I do not think, as a rule, the men are in a fit state for social intercourse. We now come to the important question of training ships. This is a question occupying a great deal of public attention and a great deal of shipowners' attention. It is regarded by many as a panacea for all the evils connected with our seamen, and many philanthropists look upon it as combining two very desirable objects, viz., getting rid of a dangerous class of our rising population and making them worthy members of society. I do not altogether agree that it is a panacea for all the evils, but I believe it has many good features, and therefore should be encouraged. Unfortunately the great bulk of those who are at present in our training ships, are not the class of boys we would select as our apprentices to make seamen of. I would much prefer a few lads brought up on the coast or in the country, to any number of these waifs of society: in fact you can scarcely expect that they will turn out anything but indifferently. Their early training and influences have been certainly not of the best character. If a better class of boys can be induced to join, the result would no doubt be different. I think, moreover, it is a very artificial system. Comparatively little training can be done on shore. If you wish to train a boy you must send him to sea, and I would suggest that proper cruisers should be fitted out merely for the

purpose of instructing these boys. First they would require a certain amount of training on shore and then be transferred to these special cruisers, for the purpose of teaching them something of their duties at sea. I do not think Mr. Brassey's plan for subsidizing owners carrying apprentices would work; I do not think we would like to be so subsidized. We do not require this artificial help. We do carry apprentices, all the large shipowners do carry apprentices, and many not only carry them without premiums but give premiums instead of receiving them. I may say, in answer to some remarks made by gentlemen who spoke at the last meeting about foreigners, and especially foreign Officers having the preference, that four or five of our present captains served their time in our employ, and all the others have been Officers with us, so that we do not forsake those who have served us. We take apprentices really with the object of making our Officers; it is not with the idea of making sailors, they are of too high a class for that. You cannot well combine the two classes, you cannot take apprentices and ordinaries or training-ship boys together, because, as in our own practice, if we take apprentices we must have all the rest A.B.'s, as we find when we do ship all A.B.'s, that there are a great many very ordinary ones among them. With regard to the pension fund for raising the status of seamen, I think that is a very desirable object, but you will not get Jack to subscribe to it. If it is done at all, I have no hesitation in saying it will be done at the expense of the shipowner, that is, whatever is put into the Pension Fund will be practically a tax on the shipowners over and above the wages. The men will not be mulcted of their wages for any such object. The foreign element has been alluded to several times in this debate, and we cannot very well dispense with it. A great many of these foreigners are the best seamen we can get, all, in fact, from the northern coasts (Norway, Sweden, and Denmark) are the best and the most trustworthy men. In fact, we make sure that if such men sign articles, they will come on board sober and fit for their duties, and, therefore, we give them the preference. We do not care for any southerners, as we find that they are not so trustworthy nor such competent seamen. The northern men, as a rule, are steady, sober, and very attentive to their duties, and are trained seamen; brought up from boyhood along their coasts, they are really our very best men and we would certainly miss them. Lord Eslington made a very telling remark when he referred to what would occur if all these 12,000 foreigners had to be dispersed in the event of a war. Now, I think the practical effect would be, that that would not occur. The sailors of any particular nation with which we were at war would perhaps leave our employ, but the bulk would stay where they were. Mr. Brassey referred, with much feeling, to the dangers and temptations that beset the sailor. We all acknowledge that, and have to make great allowances, and no one can think of these dangers and temptations to which the sailor is subject, without having his sympathies roused in his behalf and allowing very large latitude for his misdemeanors.

Mr. STIRLING LACON: Sir Hastings Yelverton, I rise at this early period of the discussion to ask your permission to read a statement which appeared in the *Shipping Gazette* of last evening. You are aware that delegates are now sitting in London from all the ports of the United Kingdom, I think as many as fifty, and this statement has been prepared in order that it may be submitted simultaneously to them and to this meeting. It contains a distinct proposition, because in reading the paper of the Honourable Member, I am at a loss to know what his proposition is, or in fact what is at this moment the proposition before this meeting. I do not agree with the Honourable Member with regard to seamen's pensions and seamen's funds. The thing has been tried over and over again, and what between the maladministration of these funds, and a variety of causes, the funds are squandered, and seldom get into the hands of those for whose benefit the fund was established. At the latter part of this statement, when I allude to the employment of the young Officers of the Navy, I believe I shall adduce facts which perhaps will rather surprise you. Since the last meeting I have been among shipowners. They had heard of our very satisfactory meeting here on Friday, and they asked me, "Who are you, and what are you?"—of course alluding to the Institution. "What is your constitution, and who are your members?" But when I told them that the discussions in this theatre were open to all comers, they said that they were very glad to hear such opinions, and especially were they desirous of hearing the opinions of

naval Officers; and even should this discussion involve another adjournment, they hoped that another adjournment would take place, in order that the subject might be thoroughly thrashed out. Now, Sir, the course which I wish to pursue is to read the following communication which I furnished to the *Shipping Gazette*, and it is headed "The Supply of Seamen :"—

"When the controversial points in connection with our Mercantile Marine are in a fair way of settlement, this subject (the supply of Seamen) will remain, and must become paramount, for it involves not only the well-being of our Mercantile Marine, but also the prospective defence of the country. No subject, said Lord Eslington, in his speech of this day at the Royal United Service Institution, is of more importance to the country, and no subject has been more thoroughly neglected. When the deputation of shipowners waited upon Mr. Disraeli a short time ago, if, instead of a series of resolutions, they had come with, say 6*d.* a ton in their hands, the Premier would probably have said to them, 'Did I not tell you, gentlemen, that you were masters of the position, and now that we understand each other we can work together, and see whether something cannot now be done for your benefit as well as for the good of the country, for Parliament has reported that there ought to be a greater interchange between the Royal Navy and the Mercantile Marine. But no words of an Act of Parliament, nor action of the Government, will put things right in a day. If an evil has been for years accumulating upon us, it may take years of hearty unanimity to get things back into a healthy condition. Above all, gentlemen, you must re-establish the old relation of master and servant, and you must take care that your servants are not driven into the coal mines and workshops of England. The days are gone by, let us hope, when they will be sent to sea with hard labour for refusing to go to sea in unseaworthy ships at the risk of their lives; while others of them have left the sea, and have not waited for such tender treatment.' Five years ago, by returns from Liverpool, it appeared that nearly 70 per cent. of the shipowners were in favour of compulsory apprenticeship; and within the last few days I am informed, upon high authority, that they are now all but unanimous on the subject. But compulsory apprenticeship would in these days be met by arguments and obstacles which would be fatal when it was brought before the Legislature. The problem is this: the boys of the country cannot get to sea, and the boy is father of the man, and it is most important in this great maritime country that we should have trained men (putting aside in these days of steam the old term 'sailor') with sea legs and sea stomachs, and a readiness of resource in moments of emergency and danger, which no landsman can either appreciate or understand, and which can only be acquired at sea when young. The word 'compulsory' has, as applied to this question, this meaning—that all should be equally weighted, for what is obligatory upon all would be a hardship upon none; and the same argument would apply to our competition with foreigners, who, equally with ourselves, must bring up their own boys. Assuming that a tax of 6*d.* a-ton is imposed, those shipowners who take boys ought to have the tax remitted, or be paid an annual sum for each boy from the general fund. What that sum shall be must be a matter of detail, but it must be made the interest of the shipowner to take boys, or, at least, that he shall not be in a worse position than his neighbour by so doing; all such boys at the age of 18—not obligatory, nor unless they shall so elect—to receive 12 or 18 months' training and education at the expense of the country, partly in such sea-going training ships as may be available, and partly in Naval barracks (great stress has been laid upon this, in order that they may receive such training and discipline on shore as is given in France, Germany, and Russia, and which cannot be acquired on board-ship); at the expiration of the training, every man to be his own master, and henceforth free to earn his own livelihood, some by volunteering for the Navy, and the rest entering the Merchant Service; no future retaining fee, training money, or pension, the accumulating consequences of which are so serious, that Mr. Goschen said he would take an early opportunity of bringing the subject before the House, which he never did. In the course of time we should have a large body of trained men in the country, with the aforesaid sea legs and sea stomachs, and, in the event of war, the country is rich enough to engage them at war wages; the question of pay during the time of

"training, in order to make the system attractive, being matter of detail; and such pay at the end of the training would form a small fund for each man to begin with, when he sets up for himself and enters the labour market. Eventually it might be found that we might get rid of the present system of training boys exclusively for the Navy at a cost of £60 per boy, as compared with £19 per boy in the ordinary training ships. Moreover, the Navy find great difficulty and inconvenience in employing the number of boys they are obliged to rear (3,000 annually): they are too good, said Sir Rodney Mundy, and he would rather have a practical seaman before the mast than one who could work a double altitude. I am no advocate for pensions for seamen any more than I am for pensions in any other relation of life. By the scheme now proposed, a man under twenty years of age is enabled to make a fair start in life as a skilled labourer, and we want to make him a reasonable being, careful and provident, and it must rest with him whether he will provide for himself in his old age or take his chance of the workhouse. Instead of retiring our young Officers, even Sub-Lieutenants, wholesale from the Navy, as is now done at great expense to the country, surely means might be devised by which shipowners might be induced to employ them during peace, as is done in France, Germany, and Russia, and thus enable them to acquire and keep up a practical knowledge of their profession, and gradually to supplant the 1,630 foreign Officers, 968 of whom are Captains in command of English ships! who, according to a Parliamentary return of last session, are employed and have obtained certificates in the British Mercantile Marine since 1860. Until recently one Englishman was in command of a German ship, but he has been removed by an order of the German Government. In future, none but Germans are to command German ships. Surely there is something very short-sighted in all this—968 foreign Captains sailing in command of English ships under the English flag when our own Officers are seeking employment! There have been 4,000 applications for Plimsoll Inspectorships! Is not an Englishman, when freed from Government interference and certificate, as good as any foreigner? Might not foreigners, in the event of war, without waiting for an embargo, quietly sail off with their respective charges to seek refuge in their own ports?"

Science has led us a pretty dance with regard to ironclads and 81-ton guns, but is not the improvement of our *personnel* of more vital importance? Ships and guns, wood and iron, won't fight without the gallant hearts to man them.

Captain BEDFORD PIM, R.N., M.P.: The question before us is—"How best to improve and keep up the seamen of the country?" I, for one, feel very strongly that there is no question at all to compare with this in importance. It is the most serious question of the day. I take a very great interest indeed in the matter, both from a national and a personal point of view. In early life I went to sea in the merchant service, and have been more or less closely in contact with the merchant service ever since. At this moment I am counsel to a large body of English seamen at the east end of London. The London Mutual Seamen's Protection Society—the largest society, I believe, in the kingdom, with a number of men affiliated to it in the northern ports. I propose, in the first place, to put before the meeting, as briefly as possible, the state and condition of the Mercantile Marine. The number of men in the Mercantile Marine at the present moment, according to the Board of Trade returns, is 200,000. Of this, not more than one-third, or 70,000, are blue jackets; the rest are all sorts of men, picked up anywhere, stokers, cooks, and the like. Of these 70,000 more than 50,000 are foreigners. This is a most serious affair—50,000 of these 70,000 are foreigners. Now we possess in the Mercantile Marine at least 22,000 ships, so that if you put on one side the decimals of my friend, Mr. Brassey, you have about one real English blue jacket to each merchant ship. When a man comes to a shipping-office, and his name is called over, he may be registered under any name he likes, there is no necessity for him even to open his mouth, and it is quite impossible for the shipping-master to know whether he is a foreigner or an Englishman. On that account the Board of Trade returns are perfectly valueless in the matter of discriminating between natives and foreigners. Mr. Brassey told us the proportion of foreigners to British seamen stood at 10:87. I am very sorry to be obliged to contradict him, but I know practically from many ships passing through my borough, and having a great deal of information about them, that the crews of British ships are composed on an average of three-fourths

of foreigners—at least it is so with the ships passing Gravesend. I have known ships myself going to sea with absolutely every one of the crew on board a foreigner, from the Captain downwards. Why the case of the English ship “Lennie,” still going on, must be familiar to all, the three murdered men were the only English on board. Last year I obtained a return in the House of Commons, and I think the figures are perfectly dreadful for any Englishman to read,—“Foreign masters, 968; foreign mates, 595; foreign engineers, 77;” total, 1,630 foreigners in the position of Officers in the British Mercantile Marine, taking ships over the world under the British flag. I ask, where would ships so commanded and officered go in time of war? I do not hesitate to say if, in event of war, we had to collect all the British seamen in the Mercantile Marine, we could not collect more than 20,000 men. I am perfectly satisfied you would be unable to get 20,000 real British seamen, and that would, *malgré* the decimals of my friend, Mr. Brassey, be rather less than one for every British ship. With regard to the Mercantile Marine being a feeder of our Service, the Royal Navy, in the present day, I am afraid that is an idea about as fallacious as the idea that we have a large supply of seamen. We find, by a return, that the number of merchant seamen who entered the Royal Navy in 1873 was 382, and that there were more than 800 deserters. Last year we find that less than 200 seamen entered the Royal Navy, and 1,100 deserted. Mr. Brassey is quite right in saying, there are no less than 16,000 men “waste” in the Mercantile Marine per annum. It is a very sad thing, but there is no doubt the calculation has been made most carefully. I see a gentleman here, not far from me, who is well able to verify this calculation. 16,000 is a frightful waste in this Mercantile Marine of ours, and how is this to be filled up? Taking every boy that you can possibly “scare up” out of the training-ships, you cannot send to sea more than 1,000 at the very outside. The apprenticeship system yields us about 4,500. If my memory is right, in 1845 we had about 16,000 apprentices, while last year there were only 4,500. Adding those to the 1,000 boys from the training-ships, which is far in excess of the mark, you have 5,500 to fill up a gap of 16,000. How do you fill up that gap? Why, with foreigners, or with the outcasts of our own country. Mr. Corry is not the only owner whose captains write home to complain that out of their crew they have only four men who can take the helm. I have known ships of 1,800 tons go to sea with only two men on board who could take the helm. Altogether there is no doubt the present condition of the Mercantile Marine, viewed from that aspect, is as deplorable as it is possible to conceive. I will now touch slightly upon the reasons which, in my humble judgment, have caused this deplorable condition of the Mercantile Marine. In the first place, we do not train any boys at all. In this country, we have 100,000 pauper-boys, under sixteen years of age, more or less on the high road to become criminals, and we have 100,000 boys, the sons of parents who are so poor that they are next door to paupers. Now, you could not by any possibility have a finer material to bring up for seamen. Look at the institution, of which I think the gallant Admiral near me is one of the visiting justices at Feltham; look at the way in which the boys of the county of Middlesex are there trained. If that sort of institution were established all over the country, see how easy it would be to turn out 20,000 good boys every year, to fill up the gap in our Mercantile Marine, if Englishmen would only put their shoulder to the wheel! We want at least 20,000 boys, trained for sea every year, and it could be done with the greatest possible ease. Another reason for this deplorable condition of the Mercantile Marine is the really wretched life that the men live on board ship. As a rule, I do not consider that the merchant seaman is at all properly fed. I do not consider that he is well treated, and I should like to read to you a petition drawn up by the seamen themselves, and presented by me to Parliament last week. The petition is to this effect:—“That your petitioners, British seamen, employed in the British Mercantile Marine, are subject to great disadvantages, by reason of the extensive employment of unqualified foreigners, and other serious drawbacks, which can only be remedied by practical legislation administered by a responsible head.”

This is a petition drawn up by the seamen themselves, and one almost in identically the same words was presented by me the session before last; so that you see it is not all a new thing. These men have considered their case very carefully

indeed. They have put it down in black and white, and I think it is an admirable answer to my friend Mr. Brassey's question, as to "How best to improve and keep up the number of seamen of the country," because the men here speak their own words on the matter. With respect to the nature of the ships themselves, that also has been a fruitful source of the men leaving the Mercantile Marine. There is hardly an employment on shore for which a sailor is not fitted, for we must all admit that the sailor is a very handy man. One of the best merchant seamen I ever met is a man I have picked up, and is now my under gardener, and he can do almost anything. There is no doubt whatever that these men can get employment on shore, and there is no doubt whatever the reason they leave the Merchant Service is because it is in such a condition that a good man won't stop. To my certain knowledge, in the group of collieries round about Shields, there are no less than 400 English seamen working under ground at this moment, all ready to answer the beck and call of the mother institution, the Mutual Seamen's Protection Society in London. I believe they would come forward in the event of a war directly, but at the present moment they are earning a living in the bowels of the earth in preference to going to sea. I have taken the opportunity of bringing down a little model with me, to show one reason why seamen do not care to go to sea in the ships of the present day. The new-fashioned ships of the present day are altogether unlike what we used to know and love so much when I was a young man. That (taking up the model) is the shape of the ship, three and a-half or four times her beam, in which we went to sea when we were young. Thirty odd years ago, when I went to sea, we had *more* ships than we have at the present moment. I admit we have more tonnage now, but we have a less number of ships. No doubt we have a much larger tonnage now, but we had more ships then. And did we ever hear of collisions coming into court in those days? Why, I have been amongst 300 ships in the Chops of the Channel, and if we collided with another ship we swore a little, but the damaged ship was patched up by those on board, and away we went. We never went into court and made a fuss about it as we do now. The vice of the matter is simply this: the shipowner who has an old-fashioned steamer cuts her in half amidships, adds about half her length, and so produces the ship of the present day (holding up the model), showing 10 times the beam for length. When you come to look at it, it is really no laughing matter. That long ship has of course to seek her displacement; she is 300 feet long by 30. Suppose she is between two Atlantic waves (illustrated by model), she has to seek her displacement, and down she goes between the waves, the result being that the sea falls inboard over her stem and her stern at the same time. There is no doubt the "London" went down through that, and there is no doubt that the 200 odd steamers which have vanished in the last year highly classed—for we lose four ships a day in this country—of these there is no doubt that at least 200, with ten times their beam for length, have been lost simply in seeking their displacement, a big wave coming over the bow and stern at the same moment, or swamping them amidships. That is one reason why men won't go to sea in a merchant ship. It is perfectly clear that this ship is built to go through the waves, and not to go over the waves, and the consequence is the man knows what it is not to have a dry shred upon him, or any of his clothes dry down below. You cannot expect them to stand that if they can get employment on shore which will give them bread and cheese. Last year I read a paper on this subject at the Society of Arts, and I will just read to you the remedy I proposed, because it is no use to enter upon a loud growl and not to suggest something to be done to remedy these fearful evils. The remedy I proposed last year was simply this:—First, a responsible head of the Mercantile Marine. Secondly, a maritime Lord Campbell's Act. I am perfectly certain if the owner of a ship had to see that his ship went to sea perfectly found and fitted, you would not want Mr. Plimsoll's services any longer. The owner would take precious good care not to run the risk of an action brought against him for the loss of the life of any one on board. Thirdly, I propose a Mercantile Marine Medical Service, not merely for the medical examination of seamen, but a hospital for the men to go to when they are sick. Go to the United States. Look at their sea-ports, and you will see magnificent hospital accommodation for the merchant seamen of that country. We are the only nation of the world where there is no hospital accommo-

dation*for our men. There are no less than 40 beds empty at Greenwich, which cannot be filled. No applicants can go into those beds, and why? Because they have not got money enough to carry it on, and here we have thousands of ship-owners, immensely wealthy men, merchant princes in this country, who cannot come down with the necessary sum to provide for the poor wretched seamen who obtain their wealth for them. Forty beds in the "Dreadnought" Hospital empty for want of funds!! It is indeed disgraceful. The fourth suggestion was training schools in every county and training ships attached, boys apprenticed, their lives insured, with pensions assured, after a certain number of years' service, by a most simple process, by insuring their lives or giving them a deferred pension from the Post Office Savings Bank, so that it would be entirely under Government control, at once a very different affair to the proposition of my friend Mr. Brassey, and there would be no fear whatever of it collapsing, as the wretched fund did that we had before. I was one of the subscribers in early life, and of course lost my money. And, lastly, in reference to the ship I have just described to you, I suggest an honest tonnage law, with taxation removed from the ship to the cargo; an "honest tonnage law," I say, because our tonnage law, at the present moment, is simply dishonest.

Captain Pim concluded by introducing his friend Dr. Ward, M.P. for Galway, who wished to say a few words on the medical aspect of the case.

Dr. WARD, M.P.: I did not intend to address the meeting until Captain Pim requested me to say a few words. I came rather to hear the views of Naval Officers on this very important question, for we cannot always depend upon what we hear in the House of Commons, at least, as far as the sailors are concerned. I think, however, there are a few remarks which I may make from a medical point of view, which, if the people interested in this question would take up, might lead to some useful legislation. Last week I had the opportunity of asking the President of the Board of Trade in the House a question with reference to scurvy, and his answer was certainly most remarkable. He stated the great regret he had in saying that scurvy was on a very considerable increase in the Mercantile Marine in this country, and, considering the advances that have been made in medical science, and the great ease of prevention of this terrible scourge to seamen, I think it is a disgrace to the country that the President of the Board of Trade had to come forward with such a statement as that. The question comes, How is it to be avoided? I believe one of the suggestions of Captain Pim would do a great deal towards it—the medical inspection of stores. When thinking over this subject I certainly was most surprised to find that Her Majesty's Navy is engaged in what I cannot but regard as a disreputable line of conduct. I find it is the habit when Her Majesty's ships come into port and their beef is not in very good condition, not to destroy it, but to sell it to brokers, who re-sell it to the merchant ships. I understand, indeed, that they take some of the bad pieces out of the barrels, but we all know when meat is in contact with bad meat, packed up for months, it is in a very doubtful condition indeed. I understand that this is the case on very fair evidence, and I believe we shall have a return shortly of the amount of this meat thus sold, and I believe also the name of the principal broker who buys it, which will be rather useful information. Then there is another point. I quite agree with my friend Captain Pim that medical inspection of stores ought to be a *sine qua non*, but there comes the more difficult question of the medical inspection of seamen themselves. I am not prepared to go the whole way with him, though I think there is a great deal in what he says; but I do think it is not at all a creditable state of things for this great mercantile country to stand almost alone without any direct hospital provisions or medical attendance for seamen. I believe if the friends of seamen would urge this upon the House,—it is not a contested point, and it is not a question of foreigners or able bodied seamen,—I think no one could object to medical provision for the sailor, whether he be an able-bodied seaman or a foreigner, because we at least want him in good health to do his work. I think if the friends of seamen, and the shipowners themselves, who are very much interested, would urge these matters in the Bill, which does not make one single provision for them, they would very easily carry either the amendments of Captain Pim, or something equivalent to them.

Captain J. C. WILSON, R.N.: Unfortunately I was not here at the beginning of this lecture, and I have only been able to take a cursory glance of the discussion which took place at the former meeting. I should like to begin by asking the honourable lecturer a question which will clear away a great deal of difficulty. Can he tell us how many of the 202,000 merchant seamen are really *bond fide* blue-jackets? because, if we can get at those figures, we shall be in a position to argue the point clearly and with some benefit. Before I came here, I looked at an old Nautical Dictionary of 1815, and found the definition of the word "seaman" there given, to imply a man who had been brought up to the sea, in contradistinction to a "landsmen" a man who had not been brought up to service at sea. I fancy a great number of people included in the appellation "seamen" really are not even "landsmen," but "shore men."

Mr. BRASSEY: I think I know a gentleman in this room who can tell me. Mr. Williamson, can you tell me what was your calculation of the number of firemen and stewards?

Mr. WILLIAMSON: I had a communication from the Registrar-General of Seamen on the point, and he gave the following figures:—About 202,000 men, so called, in the British Mercantile Marine; the total number, 202,000, embraces stokers, firemen, stewards, cooks in steamers, as well as stewards and cooks in steerage. I deduct 10 per cent. from the number of men in sailing ships, 130,000, that gives 87,000 hands in sailing ships, including ordinaries, A.B.'s, and foreigners. In steamers there are 71,000 hands; take 50 per cent. off, that gives you 35,000 seamen, making altogether 150,000 in round numbers as the seamen hands.

Captain WILSON: Now we have arrived at something definite; instead of having 202,000 seamen we have only 150,000 blue jackets, as they are called in Parliamentary phraseology, and out of those 150,000 men we may, I think, taking our naval experience because we can have nothing better, estimate that about 50,000 of those are landsmen,¹ about 50,000 are ordinaries, and possibly 50,000 are able seamen. Now from a conversation I had with Mr. Shaw Lefevre the other day, I was somewhat shaken in an opinion which I think the honourable lecturer will remember I conveyed some years ago indirectly to him, that we had then not more than 25,000 *able seamen*, which I still maintain is the right class to estimate the seamen power of your Fleet by, whether merchant or naval. The test is the number of able-bodied men you have, because you can make a cab-driver, or anyone else into a blue-jacket to-morrow; and the term "blue-jackets" is simply an evasion of the question. We know that First Lords when in difficulties about men enter a number of noices, or any trash they can get, and go and tell Parliament they have so many sailors; "blue jackets" they may be, but they are not seamen. In the Merchant Service we have, say 50,000 able seamen, and I see Lord Eslington, the other day, said that out of those at least 15,000 were foreigners, and were prime seamen; I think it most natural it should be so because if they were not prime seamen they would not as it were turn out our own men. Therefore I think it is pretty clear that in the whole of the British mercantile marine, the first mercantile marine of the world, monopolising the bulk of the trade of the world, the whole number of able-bodied skilled sailors, is only about 35,000; that is putting it at the very utmost we can possibly estimate. Supposing 50,000 able-bodied men are enough to carry on the trade of this country, we know from the Royal Navy that to keep up the number of 50,000 able seamen, we should require 15,000 boys a year, and to keep up 10,000 or 11,000 able seamen in the Royal Navy it at present requires 3,000 boys a year, therefore if we require 50,000 men for the Merchant Service we may fairly conclude that as the loss in the Navy is not greater than in the Merchant Service, we should therefore want 15,000 boys annually to make good the waste on the 50,000 able seamen. Had the apprenticeship system continued in force, and the apprentices been carried as they were in former times, according to tonnage, we should have had, at present, about 59,000 apprentices,—an extraordinary large number,—or if calculated according to the

¹ "Landsman" is a rating given to men who are not qualified for that of "ordinary." In the Navy the rating has been changed to ordinary second-class.

old rule of one apprentice to every four men in a crew, we should require about 50,000 apprentices. This would be in excess, I think, of the numbers we require.¹ Then we may go on to the question,—if we are to train boys, who is to provide and pay for them? That part of the question I know nothing about; the shipowners must settle it, but I think a certain proportion of boys are due by Government, and I will tell you why. Government draws from the mercantile marine a reserve. That reserve is estimated at from 14,000 to 15,000 men. The bulk of those men are able seamen, and, as I have shown you before, it takes 3,000 boys to keep up 10,000 or 11,000 able seamen in the Navy, therefore, I think Government should by right, and might be expected by shipowners, to train at least from 3,000 to 3,500 boys a year, or give their equivalent in money. I have no opinion of your third class reserves, no opinion of your restrictions, and as it were, ticketing the boys. One of the few cases where I differ with Mr. Brassey is in his idea of training. In passing, I ask any practical man, shipowners let them ask their captains,—captains let them give their opinions,—I am sure ninety-nine out of one hundred seamen will agree that you cannot train sailor-boys anywhere except afloat. I have gone into the question and thought it over carefully; and know the advantages you derive on shore, and the time you gain in different ways, but as Mr. Brassey very properly put it, training is artificial, so the nearer you can approach the real thing the better, and the nearest approach to reality is having training ships afloat. What you teach the boy of knotting, splicing, reefing, and steering, are matters of small importance compared to the *aptitude* gained for sea life. He can take care and provide for himself; he knows which way to turn when he goes on board a ship; and, above everything, he has acquired the language of the sea, and is in every way better fitted for the rough and tumble of sea life; the question whether he knows how to haul out an earring or not, is of secondary importance. I do not think the Commission was practical in its suggestions about having training ships as Mr. Brassey proposes. One hundred boys are not enough to have any complete organisation, and organisation is the root and branch of good discipline. As to the plan of 100 boys going off to the ships daily to school, you might just as well leave them on shore altogether. The fewer boys you have on board a ship the greater is the expense. A two-decker, with 500 boys, is a very good style of training ship, perhaps the best we have in the Royal Navy. A three-decker (with 700 boys) is more economical per head. I think Mr. Brassey says that the apprentice system still supplies us, out of these 15,000 boys which are required to keep up a proper number of men in the merchant service, with 3,500.

Mr. BRASSEY: 3,500 are supplied every year from that source.

Mr. WILLIAMSON: There are over 16,000 in the merchant service.

Mr. BRASSEY: That is the Liverpool calculation, and it has been endorsed by the Board of Trade.

Captain WILSON: That question I was going to raise, but I think the number you estimate from the training ships is in excess. I should say you do not get 1,000; in fact, when I was in the city the other day, and I had the honour of speaking before the Lord Mayor, I did not please some gentlemen present, because I told them what was a fact, that private training ships are not training ships proper. These vessels were valuable for the purpose,—there were very few of them,—they were lent for a definite and distinct purpose, but instead of that they are turned into charitable institutions, which do a great deal of good no doubt, but such boys as they do train are trained at a very expensive rate, and, collectively, they only turn out about one-fifth the number they ought, for with all due deference to my friend, Mr. Stirling Lacon, the boys in the royal training ships do not cost 60*l.* a year, and the boys are not trained for the Merchant Service for 19*l.* each. The boys sent to sea from most private training ships, cost on an average, 65*l.* per head.²

¹ The number is not so much in excess as at first appears, for supposing the boys were apprenticed for four years, there would be upwards of 50,000 serving to make good the waste on 50,000 able seamen.

² The Marine Society is an exception to the rule; boys from them are usually

and the boys trained in the Royal Navy, including pay, a free kit, and the dozen and one things we give them, cost somewhat under £40 per year. I made a little calculation the other day, and I am perfectly certain of this,—if you can put the boys into properly organised training ships, with sufficient supervision and properly conducted, making due allowance for all expenses, you could train them for from £28 to £30 a year a head, and one year is ample. Allowing for paying a premium for sending light-made boys to sea, say £10,—from £38 to £40 a head—you could turn out very good, and well trained boys, boys, the bulk of whom would be received gladly on board your merchant ships, and who would be from the first able to earn at any rate their food, if not their wage. These are the style of lads we ought to turn out; they should be respectable and physically sound, able lads. None should be taken under fifteen, and none kept more than a year, for there is a great deal of sentiment about sea service, and if you keep a boy too long in a training ship you send him to sea with all the spunk gone out of him. He is like a bottle of champagne that has been uncorked too long, there is no sparkle left, and the chances are ten to one that he deserts the first opportunity. These are my views about boys.

I touched upon the question of a third class reserve. It is a very serious thing for one to differ with his superiors, and perhaps it is a great piece of impertinence on my part to do so, but I cannot understand their making it a *sine quâ non*, that a boy should have *two* years' training, when *one* is ample, and offering £25 for what they know must cost at least £50. The third class reserve is a mistake. It is a matter of no importance to the Admiralty or the country where the men for the reserve come from. Let us draw our reserve from the best merchant seamen who present themselves, let us put as it were, into the sea the spawn, and let us draw from sea the fish, but have nothing to do with them in the meantime. Let the men come from any source, you know that to keep up the number of men in your reserve you owe the Merchant Service so many thousands of boys; put them, therefore, into the Merchant Service and draw out your full-grown sailor as you require or can get him. I can see no better plan than the one I advocated in this theatre myself for improving the royal seamen and the reserve, whilst at the same time linking the Merchant Service with the Royal Navy, which I think, is a most important matter for the country. I cannot understand how we are to expect, in time of war, that you are going to utilize your Naval Reserve men, brought up as at present with totally different ideas,—men who know nothing whatever of your ships or discipline, who, as was once said by a gallant Admiral, never have seen anything of a man-of-war but their outside; how are you going to get these men to work harmoniously with your continuous service men, a totally different class? they are perfectly distinct classes; the merchant seamen will be placed under men-of-war's men who have different sympathies and ideas, and if they work well together for the benefit of the service, it will be a perfect miracle. But the case would be very different if we took steps to link the two together. I want to see class prejudice broken down. I think Mr. Donald Currie told us in the last discussion the Merchant Service objected to Naval Officers, and another gentleman told us that there was no sympathy between the merchant sailor and the man-of-war's man. That I have always held to be the case, and I said so in this theatre some time ago. I know it to be the case, and I think it is a very great pity it should be so, and the first way to break down such a dangerous feeling is to carry out the system I proposed before; that there should be an interchangeableness between the two services. I do not believe in this tremendous deterioration of merchant seamen, or the impossibility of getting the small number of men we should require; I believe there are as good fish in the sea as ever came out of it, though the number may be less; I believe we have a certain per centage of thoroughly able men in the merchant service, and no person who knows anything about seamen will expect that every man

fine well-trained respectable lads. They are never kept more than a year under training, or entered under 15 years of age. They cost about £25 each to train. I am also informed that the "Chichester's" and "Arcthusa's" boys are not kept more than one year under training, but I have seen less of them than the others.

who goes to sea will turn out a good sailor, to be so, he must have the natural instincts and qualities of a sailor, to make him a good one, and these are only developed and brought forward by the work he has to do, but must be innate in the man, and to expect that you are going to make an ideal seaman, one of those first-rate fellows we remember, and who is treasured in our minds as our standard sailor, out of every *lad* that joins your ship, is to expect too much, it can never be so: what we want is a certain number of leading men; certain men to act as the arrow's point when it comes to emergency, to lead the others who will when thus headed do the work; a few such men are necessary and invaluable everywhere. I would bring into the Navy a certain number of young sailors from the Merchant Service, passing them in through barracks. I would reduce the continuous service men and make up the remainder of our 20,000 seamen with the non-continuous service men. These men should pass from the Navy into the reserve and returning from time to time as it suited them to come, and us to receive them. In the reserve their time should count in certain proportions which I gave before, that is in the proportion of three years in the reserve to two in the Navy, and whenever they had made up in and out of the Navy their twenty-one years' service, they should be entitled to a short service pension.

As to the question of the pay of seamen I do not know what it may be in the Merchant Service; but looking into an old book of 1815, I find the pay of petty Officers in the Royal Navy was then 46*s.* a month, while at present it is 58*s.*; A.B.'s 36*s.* 3*d.*; it is now 40*s.* 7*d.* Considering that is sixty years ago I do not think the increase of the pay has kept pace with the times; and if the same style of thing obtains in the Merchant Service, I can only say it is no wonder you do not get good men. We are certainly told that seamen and Officers in the Merchant Service are not properly paid. The reason of this is *insurance*. If you had no insurance, both seamen and Officers would be better remunerated; as a proof of that it is a well known fact that in all the large companies where the vessels are not insured, the Officers and men are of a superior stamp, and are invariably better paid. That is the root of the whole question.¹

Now we come to the last point—the interchange of Officers. I ventured, and I think I was one of the first to venture upon it, to say it would be a good thing for the Navy if we took Naval Reserve Officers for a certain period into the Royal Service. I want to see a sympathy and interchange between the two Services. We have not to look very far to see the advantage of so doing. We know the old fable of the bundle of sticks, if we are united and hang together we can carry everything before us; but why are we so powerless for good in the Royal Navy, and why are the seamen in the Merchant Service so helpless? I am putting the shipowners on one side, and am speaking of the men “who go down to the sea in ships.” Simply and entirely because there is no unity between us. Let us be united by every means in our power. Why in this great maritime country do we find that twenty-six millions are spent annually upon the Army in England and India, and only a bare ten millions on the Navy, and still the Navy is called the first line of defence? In the first place the Army is a powerful, rich corporation, and is backed up by a large Militia, and a still larger body of Volunteers. These all sympathise together, they are all one profession, and they take very good care that the second line of defence will never be short of funds or allowed to fall much astern, whereas in the Royal Navy we are a bundle of loose sticks, nobody cares two straws about us, and we bungle on as best we can till there is some great war or tremendous disaster, and then the Admirals are hung to encourage the Fleet. I approve of Mr. Brassey's proposal that there should be a certain number of scholarships at Greenwich. I would, indeed, throw Greenwich College open to all Naval Reserve Officers, let those pass through it who like; and give a certain number of scholarships for those who are too poor to pay expenses. I should like also to see the young Naval Reserve

¹ Suppose railway trains were insured like ships and cargoes, would not the result be that the directors would have less interest in their safety, that guards, signalmen, and other servants would be underpaid and inferior men? but this is an analogous case.—J. C. W.

Officers pass through the Navy and spend nine months or a year in our Service as Sub-Lieutenants. By that means, as I said the other day, we should be able safely to reduce our lists of Officers and keep them more *au fait* at their work by employing them more constantly. If I commissioned a ship and there was war to-morrow, I would be quite willing to take a large number of Naval Reserve Officers and men and take my chance with them provided they had been previously passed through the Navy. I think our Naval Reserve is not as efficient as it should be, nor as numerous. You cannot expect a Naval Reserve man to be qualified or disciplined in the time now allowed. If the men and Officers were passed through the Navy you would have a reserve on which you could depend. Mr. Shaw Lefevre said a man in a month's time properly brought up would be very effective; but where are you going to get the month in time of war? In the olden times you had twelve months to rig your ships and train your crew, but now-a-days you will be sent to sea and fight your battles in a week, and there will be no time to make your men; and when on this subject we must not forget that other countries have much larger reserves of trained seamen than we have.

I will conclude by saying I think we have every reason to be very grateful to Mr. Brassey, that with the great knowledge he has of maritime matters he should from an independent stand-point, away both from the Navy or the Merchant Service, give so carefully and so accurately a digest of facts such as he has brought before us in his excellent paper, and which has, led to such a very interesting and important discussion.

Mr. JOHN WILLIAMSON: Sir Hastings Yelverton, as I hold the position of Hon. Secretary to the "Liverpool Committee for inquiring into the condition of Seamen," I may be able to lay before you some figures that may be of use in this discussion. I must say how very gratifying it is to myself and to my Committee that so many Naval men are found taking an interest in this subject, because I believe the solution of this training question lies in a connection between the Royal Navy and the mercantile marine. I am also very glad to see gentlemen in the position of Mr. Brassey, who spare neither time nor labour in trying to do something for his country's good, endeavouring to solve this question. Mr. Shaw Lefevre at your last week's debate should not I think have made so strong a statement as is reported, that he looked upon the cry as to the deterioration of our seamen as an exaggeration. If Mr. Lefevre would show us facts and figures for his statement, I would join issue with him. In 1869, the Committee of Inquiry took its origin from similar views expressed by Mr. Lefevre, and a series of questions was issued to men who are capable of giving information, viz., shipmasters of the best character in Liverpool, London, and elsewhere; shipowners, once shipmasters, who are capable of expressing a very good opinion, and others. The result was, 80 per cent. of the replies we received stated that seamen had deteriorated, and only 2 per cent. that they were improved, and 3 per cent. that they were as good as before. I think these figures speak for themselves. I may also just add that the only Government document that has ever been brought forward, stating any contrary opinion, was a report by Mr. Gray and Mr. Hamilton, from the Board of Trade, in 1873, which was presented to Parliament, in which they did not say seamen were as good as before, but that the report of their deterioration was not quite borne out. Now no town in the country can express a better opinion on this point than Liverpool, where, at a crowded meeting to meet Mr. Gray before he issued his report, there was not a single hand held up against the statement that the sailor had deteriorated. Mr. Gray, at a public meeting in Liverpool, in the following September, makes remarks of this sort:—

"Unseaworthy sailors would lose the best of ships."

"It was now time they took into consideration the question of unseaworthy sailors."

"He believed, and those gentlemen who were his colleagues believed, that if it was really wanted to prevent loss of life at sea, they would have to begin with the sailors."

"There was also an immense waste in the Mercantile Marine from the unseaworthiness of seamen, and it was found that men were shipped as seamen who from their physical condition were utterly unfit to go to sea."

And again, at a meeting of the Associated Chambers of Commerce, held at Newcastle-on-Tyne, on the 21st of September of the same year, Mr. Gray says:—"The question of loss of life at sea was not a question of unseaworthiness of ships so much as of unseaworthiness of seamen."

I consider that report and these statements by Mr. Gray most contradictory. The evidence of the fact of this deterioration is undoubted: I cannot go back fifty years and say, the seamen then were better than they are now. I have to deal simply with the fact that they are now very bad, and also that there are not 25 per cent. of forecastle hands that know the ordinary duties of seamen. I take it that there are 150,000 hands, all told, in the Mercantile Marine, 16,000 of whom are apprentices. I may mention that these apprentices are generally not in the forecastle, they are in the round-house, or in the poop, training to be Officers and masters, so that I am dealing simply with grown-up hands. Now, if only 25 per cent. of these forecastle hands are seamen in the proper sense, we have barely 40,000 A.B.'s in the Mercantile Marine of this country. We have 19,000 foreigners, according to the Board of Trade returns, of these, a few blacks. Lascars are in some of the Suez Canal steamers, and a larger number of them in the Peninsular and Oriental boats—about 5,000. I will mention how this has arisen. The Company's Superintendent stated at a meeting in London last week, that they were obliged, from the insubordination of the men, to abolish all the white forecastle hands, and to replace them with Lascars. These Lascars I do not include in the number of A.B.'s at all. We have then remaining nearly 15,000 Swedes, Danes, and other white foreigners, in our Mercantile Marine, and, as Mr. Corry says, any shipowner in this country would be delighted to man his ships with them. All A.B.'s are paid alike, and not, as has been stated by gentlemen in the House of Commons, that shipowners take foreigners because they get them at lower wages than British sailors; they are all shipped at the same time at the shipping office, and at the same wages, and these foreigners are the best men in our forecastles—any shipmaster will tell you this.

Captain WILSON: Are these foreigners plus the 40,000?

Mr. WILLIAMSON: No; of the 40,000 A.B.'s, about 15,000 are foreigners; that gives you 25,000 good English A.B.'s in the Mercantile Marine of this country. Out of these about 11,000 belong to the first-class Royal Naval Reserve; that is what the Navy has to fall back upon in an emergency. Now I would ask Naval gentlemen, how many of those will they get in the first five or six months of a war? It would not be 3,000 or 4,000 at the outside. Mr. Brassey, in his speech, has suggested one or two excellent measures for improving the condition of masters. The whole subject divides itself into two parts, first, the remedial dealing with the existing state of things; and second, the question of supplies. In the remedial part I quite agree with Mr. Brassey, that a compulsory benefit fund for seamen should be established. Mr. Brassey spoke to a large number of respectable sailors in Liverpool last December, and without one dissentient, they agreed to this. He put before them, that no Government would impose upon them a compulsory pension fund,—they must do it of their own accord; and after he had reasoned the thing out in a most able manner, they all agreed to it; and I believe if Mr. Brassey were to stump the country, all the sea-ports would equally agree with the Liverpool men on this point. Then, as to the second remedy, viz., that before being allowed to rate as A.B., satisfactory proof of having been four years at sea should be produced. You find many A.B.'s tell you, that they wish to leave the sea, because they get no protection at all. They do not like to be in the forecastles with so many incompetent men; they say, the duties of the ship are thrown upon a few, while the others do not do the work, and yet all get the same pay. I may say that all the respectable seamen are unanimously in favour of this protection. I do not believe it would punish the shipowners in any way, the constitution of the forecastles would be improved. The pay all round I do not believe would be greater than it is now, but you would really improve the condition of the better men; you would raise

their status, and they would occupy a position which they do not occupy at present.

As to the advance notes, my friend Mr. Corry and I must differ on this point. We had a very large meeting of shipowners in Liverpool the other day belonging to the Association of Sailing Shipowners of the Port, and they almost unanimously agreed to the abolition of the advance note; the few who objected did not object on the principle of the thing, but because they felt it would produce a great deal of inconvenience to the shipowners in engaging crews. We made this suggestion, that the law should not come into operation until twelve months after the passing of the Act, which would give time to inform the seaman that they must take care to have a few pounds in their pocket, instead of coming on board ship destitute as they do now; the abolition of the advance note, I believe would, to a great extent, take the men out of the hands of crimps and harpies—and I may add, the better class of sailors wish these advance notes abolished.

Now I come to the question of the supply of good trained men. We have to deal with a recognised waste of 16,000 a year, which is about 10 per cent. upon the sailor hands all told—I think it is more, I believe it is fully that. Some people estimate it at 20,000, however, take it at 16,000. From the apprenticeship system the annual supply is about 3,500, and the training ships round our coasts supply something like 700 or 800, it is near a thousand altogether—but some of these ships supply apprentices, such as the "Conway," in Liverpool, the "Worcester," and one or two of the better class training ships, and these are included in the supply under the head of apprentices. Taking it, however, at 1,000 a year, that gives us 4,500 a year to meet this waste of 16,000 men. A great deal has been said about training ships, and the Royal Commission were strong on this point likewise. Our Committee have taken it up and dealt with it on the recommendation of the Royal Commission, but we find it very hard indeed to get steam shipowners to agree to a rating for the supply of trained hands. They do not feel the pinch as the sailing shipowners do, they get the pick of the men, while the sailing shipowners are those who alone are training seamen. I may also mention, you could not introduce a law to compel shipowners to carry apprentices, because steamers cannot take apprentices, they do not require them and they cannot train them. You would have to fall back upon sailing shipowners and only those engaged in the foreign trade. Any shipowner knows perfectly well, if there was a compulsory law to carry apprentices, no ship could be compelled to carry more than four apprentices to every 1,000 tons. On that basis we have actually more apprentices by about 2,000, than we would be compelled to carry in our foreign-going ships to-day; therefore, we must throw on one side altogether any attempt to make apprenticeship compulsory; few shipowners carry more than that proportion. I know some carry eight or ten, some four or six, and some none at all, so that the one equalizes the other. There are a number of sailing ships that cannot carry apprentices, ships engaged only in short trades or summer trades, and that lay up in the winter months; therefore, you could not force them to carry apprentices. At the same time I do believe, if you could induce shipowners to perpetuate the apprenticeship system and also to increase it a little, it would be a great boon, and I would suggest that might be done by a rebate to shipowners carrying apprentices out of the light dues. This is a very large fund and out of it we transfer about £50,000 a year to the Consolidated Fund. I throw that out as a suggestion. This is the best system of training and we ought not to neglect but to encourage it. Then as to the training-ship question; after giving every consideration to this subject, the conclusion is forced upon us, that you cannot ask the country to train seamen for the Mercantile Marine, any more than you can ask it to train bricklayers or any other tradesmen—but we say this—as the Royal Navy must have Royal Naval Reserves, and they must have them from the Mercantile Marine, it is the militia to the Navy, it is the duty of the Navy to see these are of the best possible quality, and to be so they should undergo preliminary training, and we consider, as shipowners are the first to lose these men in the event of war, the duty of the Government is to train up to the requirements of the Navy for Reserves, and to pay the cost of such training. Presuming you must have 20,000 as a first-class reserve, it would take ten training ships with 800 in each to train up to in thirteen or fourteen years,

20,000 first-class reserves. Our scheme is this, that the training should only be in connection with the Royal Naval Reserve, and that the cost of the training should be borne by the Navy Estimates—£100,000 a year at the very outside; and such lads should be taken into those ships at about fifteen or sixteen years of age, lads educated and of good *physique*, of the mechanic class, to be kept there one year and then drafted into sailing ships as ordinary seamen, and then, after three years, they would figure as A.B.'s in the Mercantile Marine, and would become first-class Reserve men in the Royal Navy. That is pretty much a brief outline of our scheme, and I believe that is the only way in which Government can be asked to do anything in the way of training seamen for the Mercantile Marine.

Admiral SELWYN: It is clear that we want a certain manufactured article, and, in order to its manufacture, it is required that we should have not shore-going ships but actual sea-going ships. It is also clear that the Navy wants what that service is likely to provide in no very large measure at present, a place for those young boys after a year's training in such work as they can learn in training ships. I do not think it would be too early to take them into training ships at fourteen years old. I recollect perfectly well when midshipmen were constantly entered below that age. They were then perhaps deficient in instruction, but we can give our instruction to a boy who comes from his parents or from the streets, which is most valuable, for a year in a training ship. Then he could be taken and ought to be taken more largely into the Navy. The present complement of our ships of war is not half what it was fifty years ago. A 6,000-ton ship does not now carry more men than a 3,000-ton ship did then. We are relying entirely on what we want during peace for peace purposes, and we are not allowing for any waste to take place, either by sending away prize crews or the deaths which would occur in war. The main point is that we should manufacture an article which is required both by ourselves and by the Mercantile Marine. The Government alone can do that in large measure, and having done that, all the other questions which have been argued will settle themselves. If you manufacture any article of any sort, beyond what the demand may be calling for, you lower the price of that article, and you will no longer have anybody saying in peace that foreign seamen were taken because they were cheaper; nor shall we have any tendency on the part of the Mercantile Marine to take foreigners instead of British seamen if they are both cheap and well trained. But to be well trained, it is in the early years of a seaman's life that he must acquire thorough notions of discipline, obedience, and morality, and that will never be taught in the forecastles of the Mercantile Marine, but it can and will be taught in the Navy. Those men will go off under a proper system to the Mercantile Marine, for no seaman is of any value who is only a man-of-war's man; he ought to go all the world over, to see the service of every country, to pass some of his time in steamers and some in sailing ships, he should know everything and go everywhere. Having got those men you need not trouble yourself about whether they will offer themselves to you or not; they will be in existence and you will get your fair share of them, as Captain Wilson says: only lay down enough of the spawn, you will have plenty of fish. To do this we may have a much larger number of training ships, but they must be under proper guidance. We must not confuse training ships which train apprentices for captains and Officers of merchant ships with those that simply provide seamen, but this has been done to a considerable extent. We must not either confuse the fact of the apprenticeship system being an eventual advantage to the Mercantile Marine, with the fact that no owner can afford to carry his goods about the world, unless he can do it at an equal price with any other man. If you burden him with any expense which does not repay him, you put a tax on his work by which he is prevented from competing with others on fair terms, and you encourage by that very act the commerce of other nations to supplant your own. You are now training a large number of foreign seamen in your Mercantile Marine for other countries; they will disappear in the event of war; you are relying on those men and even getting them into the Reserve. But you cannot rely on them; notably you cannot rely on German sailors who are under the same regulations as the rest of their countrymen for maritime service instead of military service, and you would fail, particularly in that sudden manning of a fleet which could alone conduce to any useful result.

You may get back the men after a time, but you cannot get them back at once. Your battles in future will be decided in months and not in years. Train them largely; make the article everybody requires, and leave the disposition of it, shall I say to fate or to the inclinations of the seaman? You will always find him when he is required, if you give him enough of that prospect or possibility of prize-money, that possibility of active service in which the true seaman delights, that possibility of serving under good Officers of his own choosing which existed formerly, not being tied like sheep and sent on board a certain ship on which he neither knows nor approves of the Officers. The present system does not allow the Officers to become acquainted with the men or the men with the Officers. You discharge the men and turn them adrift in many instances, where you ought to keep them on, and only those great owners of the Mercantile Marine have succeeded thoroughly who have adopted the old system of having good men and keeping them at whatever price. It is not cheap to have bad men. It is not possible to elevate any one good man while in contact with a great number of bad men. You cannot raise an apprentice into the proper condition in which you wish him to exist, of morality, abedience, and discipline, if you keep him during his youth largely in contact with those who know neither the one nor the other. The Navy is the place for proper training, and I am quite sure the Mercantile Marine will be delighted to receive from us such men as we should, under these conditions, send to them. We have to unteach so much to the mercantile seaman at present when he comes to us, that it takes us much more than a year to do that. We find it difficult enough in six years to teach men all that they are required to do on board men-of-war, and it is not to be supposed by one year's contact with a man-of-war, that a man would be deprived of those habits which are most objectionable in that situation of life: still less could we depend upon him for that *solidarité*, that feeling of ship-mate-ship which is only acquired after many years' service together. A man when he goes into action relies on his right or left hand man in proportion as he knows him, and the way to make them rely on each other is to train them carefully together in a body. We shall never do better than by recurring to many of our old principles, notably that of the apprenticeship system. I do not regard it as a hardship or objectionable in any way, that the apprenticeship system should be again enforced, even if there are to be apprentices on board steamers. If, as seems probable, a large proportion of our carrying trade should be done in steamers, it is as necessary that there should be apprentices to steam-work as that there should be others in sailing vessels, and I am quite sure the flow from the school ships into the Navy, and thence into the Mercantile Marine, can be kept up so as to fulfil the most desirable object of combining the two services together, but not by going from the inferior service to the superior, but from the superior to the inferior,—inferior, that is to say, in habits of discipline, I do not say in anything else. As regards the Officers, if we had young Officers fit to put by the side of our sub-lieutenants, to send on board men-of-war in an emergency, possibly the Naval Reserve Officer might be made equally efficient in a very short time as the Naval Officer. But we have to deal with a close service, in which a man must serve constantly to be efficient, and you would scarcely tempt men at the age of thirty or forty, after long experience in the Mercantile Marine, to take their place beside sub-lieutenants or lieutenants in a man-of-war. I think these observations will show that my chief object is to make a proper junction of the Mercantile Marine and the Navy, but to do it by passing from the Navy to the Mercantile Marine, by manufacturing the article and then passing it on. I have also observed in a previous pamphlet of mine, the means by which the men so acquired, if you desire to have Reserves, can be retained by one ever-lengthening chain. If you give to the seaman a very small fee per annum, accruing to him only when he comes back to the Navy, he will come back to the Navy whenever you want him. If you give to Mercantile Officers the same training in the Navy as they give in the French Service, that is to say, training in youth from fourteen to sixteen, and then pass them on to the Mercantile Marine, I think the Mercantile Marine would not find reason to regret the change.

Admiral Sir WILLIAM KING HALL: Captain Wilson having alluded to training ships not in the service in disparaging terms, I, having been on the "Chichester" and "Arethusa" Committee for the last ten years, believe that none

of Her Majesty's training ships turn out better sailors than the much despised "Chichester" and "Arethusa," and that none of Her Majesty's training ships have been, or are more efficiently commanded and conducted, or boys better trained, or turned out better sailors. They are not taught rifle, cutlass, or gun drill, certainly: but I will give one proof. Last month, when the prizes were given by the Lord Mayor, at the Freemasons' Hall, to the schools and these ships, a fine young sailor was present who had been 10 months on board the "Chichester," and had returned from his first voyage to Australia; had been rated an ordinary seaman; very good for ability and very good for conduct; received £2 10s. a month. As for the want of boys to go to sea, why, as a nation, we are all sailors. Wherever you find a pond, a pool of water, in any part of the country, you will find boys sculling about in a tub or on a plank, whilst in France they all want to be soldiers, and strut about in a cocked hat and wooden musket. Boys want to go to sea for the love of it. I was quite prepared to go into the Merchant Service if I had not got into the Navy. And how was the seamanship learnt? Why, the boy commenced his education by sculling and pulling a boat, and having to furl the royal on their way out. When we were young men, some of the finest warrant officers that ever stood on the decks were boys brought in as Officers' servants; the Officers took an interest in those boys, and so they pushed on. Some Captains of our ships in those days allowed an Officer, if he found a fine suitable boy in the country, who was anxious to go to sea, to bring him to the ship. My opinion is, there is a great deal too much of the pupil teacher in all these training ships. Let any man take the penny steamer in summer and go from London Bridge to Westminster, and he will see thousands of boys larking on the banks, and if you say, "Will you go to sea?" they would go at once, but they don't want to go to training ships to be crammed up with pupil teachers, they want to gain their education at sea. I will ask Captain Wilson this question, whether the boys have endeavoured to get out of one of the ships in a very discreditable manner? In the "Chichester" a boy who was birched begged to be retained, promised to be a good boy, and has been a good boy ever since. The plan we adopt is to have a test examination, let the boys know the first four rules of arithmetic, reading, writing, and as soon as they can do that, let them learn seamanship. In 1861 I was called upon by the Admiralty, when in command of the "Royal Adelaide," to send up a plan for the instruction of 600 boys. It was not half far enough advanced for them,—the four first rules of arithmetic, reading, and writing would not do, so I got out of her as quick as I could, and somebody else went into her. Let me give you a proof. A little boy in that ship was brought up to be caned; they said he was sulky, that he would not learn his geography. I said, "Dry your eyes; what's the matter, boy?" He said, "Sir, I came to sea to be a sailor. I have no father; I can write to my mother; I can read my Bible—that is education enough." I took him out of the school; I agreed with the boy. I believe there is no difficulty in getting boys if you do away with these pupil teachers. With regard to novices, we had novices. What was the finest frigate action ever performed? Sir Edward Pellew's. And what was his crew mainly composed of? Novices, Cornish miners; and we had novices in the "Royal Adelaide,"—young fellows who wanted to go to sea, who came to be sailors, and I met several afterwards petty officers. If a man's heart is in the sea, and he wants to be a sailor, he will soon make a sailor if it is in him. He wants to go to sea, he does not want to be put in training ships. Now-a-days they have to go through a medical examination, and a man may be rejected if he has a hollow tooth, or a boy one-eighth of an inch too short. We are a little too particular in that style, and we are a little too particular about the education, and to talk about this country ever wanting seamen when they are all bred seamen! In France they are all soldiers, but here every boy wants to be a sailor, and all you have to do is let him be a sailor.

Captain WILSON: I think Sir William Hall has mistaken what I have said. I have no wish to undervalue either the "Chichester" or "Arethusa," but what I did say was the ships which were lent for private training were not wholly appropriated to that work, for we find that there are under 100 trained in vessels which ought to train 500. I did not speak of the training of the boys themselves.

Mr. BRASSEY: I regret that my duties in another place require me to leave

this room, and, therefore, make it necessary that I should, without delay make a brief reply to some of the observations which have been addressed to this meeting. Sir Hastings, I am very grateful to the various speakers for the favourable terms in which they have been pleased to refer to my paper. I may honestly say it is the result of days and nights of study of a literature, which, however important it may be, is certainly not particularly attractive. I refer to the Blue Book literature under which the shelves of my library have long groaned. The volumes of Parliamentary literature upon maritime subjects during the last quarter of a century, are something quite amazing. I hope that now the public attention is at last rivetted upon this great question of the safety of life at sea, and the condition of our maritime population, some good fruit will be gathered from the abundant literary seed which has been sown in previous years by Parliament. We have heard deplorable statements with reference to the deficiency and the inefficiency of seamen, and we are all met together here to make suggestions, with a view to remedy these very serious evils. I have said in my paper that which I must now repeat, that in the first place it is a question of wages, including in that term not merely the money paid to the man but the conditions of life which are offered to him, the accommodation on board ship, fair and just treatment by his Officers, and a fair and reasonable amount of labour to perform. Those are various elements which may be grouped together under the head of wages, and I say, unless the shipowner offers to those whom he employs, terms and conditions which will compare favourably with the terms and conditions offered by other employers to the same class of men, he cannot expect to obtain their services. Indeed, unless the terms and conditions offered are adequate, it is perfectly idle to undertake any artificial or other system of training, with a view to produce the men that are required. Having trained men for the sea, and made them handy men for almost any purpose on shore, the shipowner must necessarily lose the services of the men thus placed in his hand. We have heard to-day of 400 trained seamen being employed in the collieries of the north, and we know that there is an annual loss of seamen, from the fact that men seek shore employment in preference to the sea. Then you have another competitor in this matter, I mean shipowners of the United States. I do not know how the wages compare at this moment, but I believe, until a very recent date, it was the case that the wages in American ships were somewhat higher than those in English ships, and as a consequence, the American Merchant Navy was largely manned by men who had left the British Service to sail under the American flag. Therefore I say, unless the wages are adequate, it is idle to expect our merchant vessels shall be properly manned. The question of wages I need not refer to at greater length, it being especially a question with which the shipowner has to deal. The other point to which I should like to refer is the question of training. The question is whether the Government can assist the shipowner in this important work. We are all agreed that the Government cannot interfere simply to enable the shipowner to obtain labour on cheap terms. The action of the Navy must be limited, with a strict reference to our naval requirements, and having regard to the essential importance of creating a sufficient reserve of well-trained seamen to man the Navy in case of the emergency of a great naval war; the question is whether it might not be a national duty, which devolves upon our statesmen to consider, how best the Government may combine with the private shipowners in order to provide this Naval Reserve. At the present time I believe the Naval Reserve is up to the strength laid down by the Admiralty Regulations, but the strength required under the present Admiralty Regulations is considerably less than the strength recommended by the Manning Commission of 1859; and it is a debateable point whether the Admiralty have been well advised in reducing the strength of the Naval Reserve to the standard at present adopted. I think that if the Government is to assist in training seamen with the view to providing an adequate Naval Reserve, of all plans which I have ever seen, the best and the most practicable appears to be the plan recommended by the last Manning Commission. As I sketched out the details of that plan in my paper, I do not think I shall be occupying your time satisfactorily if I go over the ground again. It does certainly suggest itself to me, that it would be a great advantage to the shipowners and to the Mercantile Marine generally, if there was established in every great port a thoroughly efficient training vessel, con-

ducted by Naval Officers, upon the principles which have been followed with so much success in the ships already established at Portsmouth and Plymouth. Captain Wilson, who speaks with very great authority and experience on this subject, says the kind of training vessels proposed by the Manning Commission are not so satisfactory as larger ships, that it is an extravagant thing to train only 100 boys in a ship, that you have a larger staff in proportion, and other expenses are increased in proportion to the number trained. I suppose that the Manning Commission intended, by limiting the number to 100, to afford the means of training a number of other boys side by side with the boys whose expenses were defrayed by the Admiralty, and thus they suggested the plan of day boarders. I think they also suggested that if you provided a ship, which was capable of taking 300 boys for training, and you only filled up 100 of those places by boys paid for by the State, it would afford an opportunity to the shipowner, or to benevolent persons and people interested in boys, to send them to these ships to be trained on the Admiralty system, and to be paid for from private resources. So many points have been raised, that it would be impossible to deal with them all. Something was said about Officers, and I certainly myself should welcome any practicable proposal for giving to the Officers to whom you give commissions in your Naval Reserve, the immense advantages of some experience in the Navy. No doubt there might occasionally be difficulties, but when we take into view the class of youths who are now going to sea in the Merchant Service, and who are now being brought up in the "Conway" and the "Worcester," I cannot see that there should be any practicable difficulty in selecting for the distinction of a commission in the Naval Reserve only such Officers in the Naval Service as you would be very glad to associate with Naval Officers in the Royal Service. Mr. Lindsay years ago pointed out in his very able separate Report on the Manning of the Navy, that there were in the Merchant Service ample materials for such selection, and what Mr. Lindsay said in 1859 I believe is far more true at the present time. If the Navy would associate itself more intimately than hitherto with the cream and flower of the Merchant Service, they would do a great deal both to strengthen the Navy, by providing reserves of Officers as well as reserves of men, to whom we should look with confidence in time of war, and also by adding materially to the professional status and efficiency of the Officers of the Merchant Service. You want to make the command of one of our noble merchantmen a recognised and an honourable professional career. At the present time, in our over-peopled country, the difficulty for hundreds and thousands of young men, well educated and well born, is to find an opening. I venture to say the command of a fine merchant ship is a career at least as honourable and as attractive as a good many of the very miscellaneous employments to which young men are now looking; and I do not know that there would be any means so likely to make a career of the kind that I am describing, attractive, and to give it a professional tone and professional recognition, as the association of these Officers, at an early stage of their career, with the Royal Navy. I have spoken of this recognition and association of the merchant Officers with the Navy in a Naval Reserve point of view. I believe that if you could by this means elevate the status of the Officers of the Merchant Service, and give them that independence which I should like to see them possess, you would most materially contribute to promote the greater security of life at sea. There are, no doubt, cases in which Officers in command of merchant ships do not speak their minds as freely to their owners as they should; they are afraid to do it. I have known instances in which it has been the case. I say if you could, by the means I have proposed, and by other means, put the Officers of your Merchant Service in a position of the same professional independence, with regard to professional matters, which a barrister enjoys when he is consulted by a client upon a question of law, you would have provided one of the most effectual guarantees you could possibly provide for preventing the sending forth to sea of ships which were unseaworthy from any cause whatever.

I will not trouble the meeting further. I have listened to what has been said by various speakers with profound interest. I can only hope that I may be able in another place to turn to account what I have learned from this discussion.

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Evening Meeting.

Monday, 31st January, 1876.

ADMIRAL SIR HENRY CODRINGTON, K.C.B., in the Chair.

NAMES OF MEMBERS who joined the Institution between the 18th and 31st January, 1876.

LIFE.

Montgomery, A. J., Lieut. R.A.

ANNUAL.

Thompson, W. H., Capt. 1st King's Dragoon Guards.	Hastings, Warren, Lieut. 2nd W. I. Regt.
Rose, Henry, Commander R.N.	Patchett, W. Gordon, Lieut. 2nd W. I. Regt.
Aylmer, H. L., Lieut. 16th Lancers.	Murphy, J. A., Lieut. 2nd W. I. Regt.
Hammond, R. H., Commander R.N.	Godwin-Austen, Fredk., Lieut. 2nd W. I. Regt.
Walker, Robert, Capt. Lon. Rifle Brigade.	
Jones, R. W., Lieut. R.N.	Stanley, Edward, Lieut. 2nd W. I. Regt.
Andrews, J. W., Lieut. 11th Regt.	Thompson, J. H., Lieut. 2nd W. I. Regt.

PROPOSED NEW COMBINATION OF PROPELLERS FOR SHIPS OF WAR.

By GEORGE QUICK, Engineer, R.N., H.M.S. "Tenedos."

(Read by Captain J. C. Wilson, R.N.)

As the cost of each individual vessel of war is now much greater than formerly, so also is the individual importance of each vessel greater as it bears a larger proportion to the total naval strength of the empire. Thus, a modern ironclad costing £400,000, may be considered equal in importance in every respect (except number of crew) to a squadron of four or five of the line-of-battle ships of thirty years ago costing the same sum of money. Now, whilst it is hard to conceive any com-

combination of circumstances which would disable simultaneously a squadron of the old vessels, it is too well known that an ironclad of the same money and fighting value may be, and often is, disabled by a slight accident to her machinery. How much more frequently such accidents will happen, and how much more serious the injuries will be in war time, it is difficult to say, but that they will be more frequent and serious than in time of peace, is, I think, to be fairly presumed. It is generally admitted, that in future naval actions the failure of the propelling power will place a vessel completely at the mercy of her antagonist, hence the safety of the ship depends entirely upon the retention of her motive power. Considering this, and the many sources of danger arising from torpedoes, ramming, &c., I cannot concede that even twin-screw propellers afford that security from total disablement which modern naval warfare requires. Being thus impressed with the necessity of greater security for the propelling power of war vessels, I have been induced to forward a certain proposal to the Admiralty for the purpose of providing it, an account of which I beg to submit to the consideration of the members of the Royal United Service Institution, in the hope of its receiving that free criticism which is always required for proposed innovations, and with the view of eliciting the opinions of those Officers who may have the great responsibility of commanding vessels in action.

Description of proposed new arrangement of Propelling Power for Ships of War.

The objects sought to be attained are, (1st.) Greater security for the propelling power and for the ship when in action. (2nd.) Greater economy of fuel at low speed with less wear and tear of engines and boilers than at present. (3rd.) To turn vessels quickly and in a very small circle, as well when they have no progressive motion as when moving at a high speed.

To attain these objects, I propose to supply additional engines for driving a turbine, or one or more centrifugal pumps for hydraulic propulsion, in such manner that when only a small speed is required—say under nine knots per hour—these engines can be used alone for propelling, and when higher speeds are required they can be used in conjunction with the screw engines. The discharge nozzles should be fitted with valves so as to allow the propelling streams from the turbine or pumps to be quickly diverted from going astern to a line at *right angles to the keel*, or right ahead, whenever it may be required either to turn quickly or to go astern, and the orifices for supplying the turbine with water to be fitted with valves that could be closed when required, so that in the event of injury to the ship's bottom from torpedoes or any other cause, the turbine would be able to draw its supply of water from the leakage, and by this means keep the ship afloat. Safety would be attained for the propelling power by thus dividing it into independent sections located in different parts of the ship; the different sections being used for different speeds; thus, the turbine could be used alone for speeds under seven or eight knots, the screw or screws being hoisted or placed vertically; for intermediate speeds—

say over eight and under twelve knots—the screw could be used alone; whilst for speeds over twelve knots, both screw and turbine could be used together.

Now, it is evident that for the same maximum speed to be attained in a given ship, at least the same total amount of steam must be supplied by the boilers, and that the power of the screw engines may be reduced in proportion to the power of the additional engines supplied for hydraulic propulsion. As an illustration of the application of this principle, I give the following:—Suppose a vessel is intended to have a speed of fourteen knots per hour, her nominal horse-power to be 1,200, and to indicate 7,200 horse-power. I propose to divide the boilers into three independent and isolated sections, one of 600 nominal horse-power, and two sections of 300 nominal horse-power each; with valves so arranged that all the boilers could be, if required, connected together, or any one section of boilers connected with any one pair of engines. By this division, the efficiency of a portion of the boiler-power is rendered more secure. As regards the engines, 900 nominal horse-power, equal to 5,400 indicated, would be appropriated for the screw-propeller or propellers, and 300 nominal, equal to 1,800 indicated, horse-power for the hydraulic propelling engines. Now, if a similar ship fitted only with the screw in the usual manner, has been propelled 14 knots per hour with 7,200 indicated horse-power, the speed of the proposed ship with screw-engines indicating 5,400 horse-power, will be 12·6 knots per hour, that is calculating according to the approximate rule that the speed varies as the cube root of the power:—

$$\text{Thus } S_1 = \frac{\sqrt[3]{\text{I.H.P.}_1} \times S}{\sqrt[3]{\text{I.H.P.}}} = \frac{\sqrt[3]{5400} \times 14}{\sqrt[3]{7200}} = 12\cdot6 \text{ knots.}$$

With the hydraulic engines alone working at 1,800 indicated horse-power, the speed of the vessel will be 8·8 knots per hour:—

$$\text{For } S_{11} = \frac{\sqrt[3]{\text{I.H.P.}_{11}} \times S}{\sqrt[3]{\text{I.H.P.}}} = \frac{\sqrt[3]{1800} \times 14}{\sqrt[3]{7200}} = 8\cdot8 \text{ knots.}$$

Or if these hydraulic engines are used at half-power, = 900 indicated horse-power, the speed will be 6·9 knots, say 7 knots per hour.

It is evident that as hydraulic propulsion hitherto has not proved quite so efficient as screw propulsion, the extreme maximum speed attained by using the two together at the same time may not be quite so great as by the single screw using the same amount of power, but the enormous advantage of security to the propelling power and the ship, with rapidity of turning in action, *especially for ramming*, far outweighs a slight loss of extreme maximum speed, if any such loss should be experienced. In short, by the proposed combination of hydraulic and screw propulsion, all the advantages of both systems may be obtained in one vessel without the disadvantages attending on the use of either separately.

In proposing the preceding division of steam power between the

turbine and screw, I have considered that the former engines should be sufficiently powerful to enable the vessel to remain in action, by being capable of moving at an effective fighting speed, even if the screw engines should be entirely disabled; and I have estimated that $8\frac{1}{2}$ knots per hour would be sufficient for that purpose.

But the proportion of turbine to screw-power may be very different from the foregoing, so as to suit the construction of the vessel or the service for which she may be specially designed. It is obvious that we cannot demand unlimited space and choice of location for our engines, but must make the best use of that which is assigned us. The following Table shows approximately the results which would be obtained by various proportions of turbine to screw-power, when the total steam power remained the same:—

Division of Power. Total 1,200 N.H.P.	Maximum speed in knots per hour.		
	Turbine alone.	Screw alone.	Both combined.
Hydraulic 1 to Screw 1 = 600 N.H.P. to 600 N.H.P.....	11·1	11·1	14
Hydraulic 1 to Screw 2 = 400 N.H.P. to 800 N.H.P.....	9·71	12·25	14
Hydraulic 1 to Screw 3 = 300 N.H.P. to 900 N.H.P.....	8·8	12·6	14
Hydraulic 1 to Screw 5 = 200 N.H.P. to 1,000 N.H.P.....	7·7	13·15	14
Hydraulic 1 to Screw 7 = 150 N.H.P. to 1,050 N.H.P.....	6·9	13·3	14
Hydraulic 1 to Screw 9 = 120 N.H.P. to 1,080 N.H.P.....	6·47	13·48	14
Hydraulic 1 to Screw 11 = 100 N.H.P. to 1,100 N.H.P.....	6·1	13·56	14

The foregoing Table is calculated on the assumption that engines of 1,200 nominal horse-power would propel a similar vessel, fitted with the screw alone, at a speed of 14 knots per hour.

Applying this principle to a well-known vessel, Her Majesty's ship "Devastation," of 800 nominal horse-power, and taking the results of her trial trip as data, namely, speed 13·8 knots per hour, indicated horse-power 6,630, the following speeds would be attained by the turbine and screw respectively:—Turbine engines 200 nominal horse-power, speed by ditto, 8·6 knots per hour. Screw engines 600 nominal horse-power, speed by ditto, 12·55 knots per hour. If, however, the hydraulic propelling engines be of 100 nominal horse-power only, the screw engines being of 700 nominal horse-power, we get a speed of 6·9 knots by the turbine, and 13·21 knots per hour by the screw engines alone. The speed in each case with the combined propellers being 13·8 knots per hour nearly.

But if the screw engines remained as at present and room could be found for a pair of engines and turbine of only 50 nominal horse-

power, the speed by these small engines alone would be 5.47 knots per hour; whilst the efficiency and safety of this vessel as a fighting machine would be much increased by the facility afforded for turning in ramming and torpedo attacks.

In lieu of one pair of engines working a single turbine of great capacity, it would be possible, and in some cases desirable, to use two or more sets of independent engines and turbines of small power, and separated by water-tight bulkheads. But this is a matter which would be determined by the proportions and nature of the ship. Again, by the adoption of the auxiliary hydraulic propeller, a single screw may, in some cases, be used advantageously in lieu of twin-screws, by which considerable economy of space would be effected, and the coal-bunker capacity increased.

I have given no drawings to illustrate the application of this system, as the detail depends so much upon the nature of the vessel to which it may be applied.

From the foregoing it may be seen that the turbine may be applied as an auxiliary propeller in three different ways:—(1st) as a powerful auxiliary to the screw, capable of maintaining a ship in action after the screw engines are disabled; (2nd) as a feeble auxiliary, occupying little space, but sufficiently powerful to drive a mastless or other vessel for very long distances at low speed, which speed would not be sufficient for fleet actions or for heading against a gale of wind; (3rd) in very large vessels of the "Inflexible" type, whilst considerable turbine power may be supplied for propulsion, and located so as to exert its maximum efficiency for that duty, a small turbine may be supplied and placed in the best position to enable it to perform the special duty of quickly turning the vessel, and also for acting as a bilge pump and fire engine.

I anticipate great economy of fuel to arise from the use of the turbine engines alone, when a low speed only is required; the economy resulting from the use of small engines working at nearly full power, instead of using screw engines of great weight, frictional resistance, and large heat radiating surfaces at very low power. Having had occasion to study the effect of the reaction of streams of fluid for a special purpose, I have arrived at the conclusion, that for vessels of very fine lines, the turbine may be used for the sole propeller as efficiently as the screw, provided it be properly proportioned and constructed to suit the vessel and speed for which it is intended. The great point to be considered with regard to *full powered* turbine-propulsion is this, whether with a given cubic capacity, weight of machinery, and coal consumption, the turbine can propel a vessel at as great a maximum speed as the screw propeller can. If it can, then the turbine will rival the screw as a sole propeller. If, on the other hand, the turbine could be made, with the same bulk and weight of machinery, to give a greater maximum speed with the same economy of fuel as the screw, then it would totally eclipse the latter. On this question it is well to observe, that whereas thousands of screw-propellers have been made and tried, and are now fitted so as to be capable of being altered in pitch to suit the vessels to which they

belong, only a very few experiments have been made with hydraulic propulsion, and none at all, that I am aware of, of an exhaustive nature, involving alterations of the machinery.

But if we can only make the turbine within certain limits to approach the screw for speed and economy, then it may be used with advantage as an auxiliary propeller, in consequence of its capability of performing most important duties, other than propelling, which the screw cannot be made to do.

I have thus briefly stated my proposal for your consideration as Combatant Officers, for I venture to look upon it as your province to say whether auxiliary hydraulic propulsion should be used; and if so, in what proportion to the screw, and for what purpose; and the Engineer Officer's duty to be to design the most powerful and compact machinery to occupy the space and location the Naval Constructor may provide for it.

In conclusion I may state that I have designed means to obviate certain defects and difficulties which have been hitherto experienced in the application of hydraulic propulsion, and which have retarded its extension.

These means being, however, a matter of mere mechanical detail, I do not ask you to condescend to consider them, but to consider the important general question as to the desirability, or otherwise, of using hydraulic propulsion as an auxiliary to the screw in large vessels of war.

ADDENDUM.

Since writing the preceding, news has reached me of the sinking of Her Majesty's ship, "Vanguard," of 5,312 indicated horse-power, by the "Iron Duke." This event must, I think, bring into prominence the question of the amount of pumping power required on board the fighting ships of the future; for the effect the sinking of only a single ship in action would have on the rest of the fleet to which she may belong, is a matter for serious consideration now. That the present pumping arrangements on board ship are utterly inadequate to deal with such leaks as are likely to occur in action, and to steam vessels generally, is proved not only by the loss of the "Vanguard," but by the sinking of the "Ré d'Italia," "Flamstead," and "Ville de Havre," all of which were full-powered steamers. Other examples may be named, such as the screw sloop "Amazon," and many others. These cases show that the "bilge injection valves," so much relied on by marine engineers and shipbuilders generally, are totally insufficient to cope with the flood of water arising from collisions, and which will arise from injuries by torpedoes and projectiles. Now it being impossible to construct vessels which shall be invulnerable in all parts, it is necessary to consider these three questions:—(1st), the probable size of the breach, or orifice, which will be made by rams or torpedoes; (2nd), the amount of pumping-power requisite to prevent a leak of a given size from gaining on a ship; (3rd), the means to be employed for temporarily checking the rush of water into the vessel when the breach is very large indeed.

The first question cannot be definitely answered at present; as the exact size of apertures in the vessels sunk is unknown; and there is sufficient experience of the extent of the injuries which may be inflicted on iron vessels by torpedoes exploded in actual contact. The second question, however, can be easily solved for any particular case; and to afford a ready method of approximately estimating the power required for general cases, the following example is calculated for the particular case in which the breach is exactly *one square foot in area*, is at the mean hydraulic depth of *eighteen feet below the water line*, and the height of lift *twenty-five feet*; being the difference between the level of the water in the ship, and the surface of that outside. The assumed depth of the breach, and height to which the water must be lifted by the pumps, may be, I think, considered fair averages for a number of cases; but these two quantities may differ considerably from the above named values without greatly affecting the accuracy of estimates formed on those values—every foot of difference of level between the water inside and outside the ship affecting it to the extent of about *four per cent*; and every foot of difference in the mean hydraulic depth of the breach, from that assumed, to the extent of *three per cent*. The following is the calculation:—

Let A = Area of the breach = 1 square foot.

h = Hydraulic mean depth of breach below water line
= 18 feet.

V = Velocity of flow of water through breach in feet per second
= $8.025\sqrt{h} = 8.025\sqrt{18} = 34$ feet.

K = Coefficient of contraction of orifice due to friction of its edges, &c. = 0.8. (This value allows a fair margin for safety—the value derived from experiment on orifices in thin plates being about 0.6).

Q = Volume of water, in cubic feet, entering ship per second
= $A \cdot V \cdot K = 1 \times 34 \times 0.8 = 27.2$ cubic feet.

d = Weight of cubic foot of sea water = 64 lbs.

W = Weight of the water must be lifted per second to prevent the leak gaining on the ship = $Qd = 27.2 \times 64 = 1740.8$ lbs.

H = Height which the water must be lifted to be discharged
= 25 feet.

WH = Work in foot pounds to be performed per second
= $1740.8 \times 25 = 43520$ foot lbs.

Let x = Gross indicated horse-power of pumping engine to perform the work.

E = Net energy in foot lbs. = $W \times H$.

k = Co-efficient of efficiency of steam engine = 0.8.

k_1 = Co-efficient of efficiency of centrifugal, or turbine-pump = 0.75.

k_{11} = Co-efficient of efficiency of engine and pump combined
= $k \times k_1 = 0.8 \times 0.75 = 0.6$.

$$\text{Then } z = \frac{E}{550} \times \frac{1}{k_{11}} = \frac{43520}{550} \times \frac{1}{0.6} = 131.78 \text{ I.H.P.}$$

Say, 130 I.H.P. required to keep leak from gaining on a ship when the breach is *one* square foot in area, *eighteen* feet below water-line, and height of lift *twenty-five* feet, whence we can estimate the area of breach aperture that any given steam pumping-power is sufficient to contend with; or the pumping-power required for any given area of breach. This in the case of the "Vanguard" if one-third of the engine power, that is $\frac{5312}{3} = 1770$ I.H.P. had been applied to

hydraulic propulsion, the area of the breach which could have been successfully contended with, by using the turbine as a pump, would have been $\frac{1770}{130} = 13.6$ square feet. Or the amount of indicated

horse-power requisite for a given area of breach is found by multiplying the number of square feet by 130, which gives the answer.

It may not be amiss perhaps to state the number of men which would be required to work the pumps continuously to prevent a leak through a breach of one foot square and 18 feet below the water line from gaining on the ship, as such a statement may dispel some vague notions on the subject. On the authority of Poncelet and others, Professor Rankine states that the work of an average man turning a crank, as in pumping, is 1,296,000 foot lbs., operating only eight hours a day. The work per minute would be $\frac{1296000}{8 \times 60} = 2650$

foot lbs., and $\frac{2650 \text{ ft. lbs.}}{33000 \text{ ft. lbs.}} = 0.08$ horse power.

Now we have seen that 130 gross indicated horse-power = 79 net horse-power, would be required to perform the work to be done, hence $\frac{79}{0.08} = 987$, is the number of men required at the pumps continuously; and of course double that number for spell and spell. By this we see the small utility of manual-power-pumps in contending with leaks or large fires.

To give a more popular illustration of the question, the weight of water entering a ship per minute through an orifice one square foot in area, and eighteen feet below water line, may be stated. As 1740.8 lbs. enter per second, 46.6 tons will enter per minute, and 2,796 tons per hour. This plainly shows the immense use watertight compartments have been in recent disasters in effecting a saving of life by giving time for escape; when, but for them, owing to the immense size of the breaches, the vessels injured must have been sunk almost instantaneously and all lives lost. I have no knowledge of the actual area of the breach in the "Vanguard," but taking into consideration the fact that it was nearly an hour after being struck before she sank, it may be safely concluded, I think, that if engines of 1,000 I.H.P. = say 160 nominal, had been applied in that ship to hydraulic propulsion, and the turbine had been used as a pump after the accident, that vessel would now be safely in dock undergoing

repairs. For we have seen from a foregoing calculation that whilst a hole a foot square will admit 2,796 tons of water per hour (quite enough to sink the "Vanguard"), yet we have also seen that an engine of only 130 indicated horse-power would discharge the same, lifting it a height of twenty-five feet. I have specially mentioned centrifugal and turbine pumps as no other kind is anything like so efficient for the power applied.

We now come to the third question: the means to be employed for temporarily checking the rush of water into the vessel when the breach is very large. It is unnecessary to say that a breach may be so large that if all the engine power in the ship were applied to the pumps, the leak could not be kept under for any great length of time, unless the rush of water could be reduced. But with the knowledge that there is very large pumping power on board, efforts could and would be made, not actually to stop the leak—that may be impossible—but to check it, so as to bring it within the power of the pumps. And as the pumps would prolong the time *between the injury of the vessel and the complete drowning out of the fires*, it is easy to conceive that time may be found to diminish the leak (by means of bags of oakum, large sails, awnings, &c., drawn over the apertures on the outside of the ship) to such an extent that the pumps may at last equal, or even master, the leak before the fires were extinguished. If they could not, it would be useless wasting time by attempting to work the hand pumps. But I think the time has arrived for special appliances for covering orifices and checking leaks to be supplied to fighting vessels. Such appliances could be made of large size, yet occupying little storage room on board, moderate price, capable of adapting themselves to any form or part of the vessel, strong enough to resist the pressure of the water on the back, and capable, by means of that pressure and its own elasticity, of forming a moderately good joint even in the case of the most ragged hole that a torpedo explosion could produce; and combining with these qualities the most important one of being quickly applicable to any part required under all circumstances, as well by night as by day. Such an appliance I cannot at present submit to your notice, but I may have, possibly, an opportunity of doing so at some future time, when I hope it may be found a satisfactory solution to the question suggested many years ago by the eminent engineer, Mr. Nasmyth, viz., *can "a hole as big as a church door in a ship's bottom" be stopped?*

I have to apologise for dwelling so long on so simple a matter of mere detail, but I have done so because I do not think it receives quite so much attention as it deserves, and also because *I do not consider that the giant steam power of our ships should be only available for mere propulsion and nothing else, when it is capable of a far greater range of usefulness.*

In conclusion I beg to state my opinion that, however perfect and powerful the machinery, pumps, and other appliances on board may be, the engineer officers must have very high moral qualifications—and I use the word *moral* in its widest sense—as well as first class mathematical acquirements, to make effective use of them, and to

develop their capabilities to the utmost limit in the moment of urgent need and danger. But to successfully cope with such exigencies and accidents as may and will arise in action, Engineer Officers should have more authority over the *matériel* and all the mechanical labourers afloat than at present, as well as a higher position as Officers to maintain that authority.

Admiral SELWYN:—I think we may congratulate the Navy on the possession of an Officer who can write such a paper, and who can entertain such views while he is still afloat, showing such little prejudice in favour of that to which he is accustomed, and which he has been principally working, for it is the one indication of progress when those who are actually working, not alone those who have worked in the past, or may work in the future, begin to consider what can be done to improve, and as boldly to state it. I have for a great many years in this Institution, strongly advocated going much farther with the hydraulic propeller, which I believe is possible, but I will confine my remarks to the view which Mr. Quick takes of its utility, first, as an adjunct to the screw, and secondly, in its character as a pump. There is no doubt, first of all, that our experiments with the hydraulic propeller have hitherto been of the most unsatisfactory character as regards the records made of them, the opportunities given for studying them, and the attention paid to them. Had the screw been treated with as great a neglect as the hydraulic propeller has been, had it been so little backed up by capitalists and others, I doubt whether we should have had the screw to-day, but I am quite prepared to think not so great an improvement was made by the substitution of the screw for the paddle, as will eventually be made by the substitution of the hydraulic propeller for the screw. I remember perfectly well those who advocated the use of the screw were met with the statement, that it could never be used except as an auxiliary, but that idea has of course been given up long ago. I think, however prudent it may be to put one foot forward at a time, and to introduce the hydraulic propeller as an auxiliary, we shall yet very soon after we begin to understand its uses and its efficiency, regret that we ever took it as an auxiliary only. The great point which Mr. Quick has not adverted to in his estimate of its efficiency is this, that whereas in the paddle and screw we are dependent on the immersion of the ship for the power which may be developed by any amount of engine-power you put on board that ship, the hydraulic propeller has no such limit, as it derives its effect from reactive efforts alone. Any amount of power that can reasonably be put into the ship and for which fuel can be found may be usefully exerted at all times by the hydraulic propeller, while with the paddle in rolling, or the screw in pitching, a very large proportion of the power is lost. I think in cases where a vessel is fitted as he proposes with a combination of these two propellers, the screw and the hydraulic, and in a heavy following sea, with the screw doing nothing but attempting to break the engines down, slowly propelling the ship ahead, but causing everybody the greatest anxiety lest the engines should be broken down by the racing they are subjected to,—here I believe the screw might be let alone altogether, and the small hydraulic auxiliary power would do quite as much duty without any waste whatever; that is to say, the ship would go ahead as fast with a very small auxiliary hydraulic propeller as if you were using the large effort of the screw only partially effective; and that would be a very great advantage. There is no doubt also that the screw is subject to many exterior accidents to which the hydraulic propeller is not liable, and that in action these would be multiplied not only by the efforts of the enemy to ram the ship, or from any accident occurring from torpedoes, but also from the unavoidable fouling in a sea which would probably have floating wreck in it, for as you go about in a heavy smoke, not able to see and to steer clear of floating wreck, you must necessarily expect occasionally to foul the screw. This would reduce the ship to a condition of absolute helplessness, and in such a case the hydraulic propeller would have a very great advantage. I think there must have been some error in Mr. Quick's calculation with regard to the manual power required in lifting-water. I am glad to say it is all on his side; he has made a very wise error if it is an error, but I do not think even Poncelet and Rankine would ever tell us the efficiency of

one man is one ton a minute, one foot high of water lifted. There is some mistake which very often occurs in these cases,—that is all in his favour; it would show that the 130 horse-power would do more than he states.

Captain WILSON: Mr. Quick states that a man is capable of raising 2,650 foot pounds per minute, equal to 0.06 horse-power.

Admiral SELWYN: We all know what a very wearing-out business pumping is if you come to put men at it; they rarely do their work quite as an engineer would desire to see them do it. Mr. Quick gives us some very useful figures if we apply them generally. I see he says this must be a function of the immersion of the ship, and a ship at sea is always varying her immersion at any one point. She may be rolling. She may roll the leak higher up, or she may be subjected to such a swell as leaves the leak occasionally almost bare. Supposing she has a leak in the fore compartment, and is running at high speed; it is clear the water will enter with a greater velocity; so that his figures will require revision before we accept them as anything on which we can put a fair estimate of what may be done. I think we must recognise the fact that the hydraulic propeller does present to us for the first time the means of utilising a very large proportion of engine-power on board a ship to encounter those enemies which seem most likely to be formidable in modern warfare, the ram and torpedo, and those which most seamen will view with the greatest dismay, simply because they are not to be guarded against as we can guard against many other things of the kind. Call it a great pump, rendered necessary by modern conditions, and I think even on that view of the question we shall be prepared to accept such an auxiliary power for this purpose; but if we can get by any process whatever a series of experiments tried with the inefficient application of the hydraulic propeller we have got at present,—fairly tried to the bitter end, giving the actual results tabulated in such a way as that the whole profession can avail themselves of them, then we shall be able to go ahead; we shall be able to detect the points in which the hydraulic propeller has not proved thoroughly satisfactory. It may, however, be claimed that a very large amount of satisfaction has really arisen, and that from the first application of it, it has not proved inefficient,—the ship is still going about,—I say by this means we should be able to make progress in a direction which will have, I am sure, very great value. There is another point about the hydraulic propeller which is one of its great excellencies, that if we choose, and it seems likely we shall have to choose, to mast our ships again properly, and to give them efficient sail power, it does not offer any of those obstacles to rapid motion under sail which the screw must necessarily do, still less does it make a great difficulty in the steerage which the screw always must do. You cannot with impunity have a large vacancy close in front of the rudder if you desire to have a ship that will steer well as we used to consider ships ought to steer, and the hydraulic propeller will give us a machine which will not have that disadvantage. Also on the question of grounding, it is well known in a late case off the coast of England, the very first attempt to back the ship astern after grounding resulted in the breaking of the propeller. The hydraulic propeller is subject to no such contingency, if the points at which the water is taken in and given out are properly chosen. A ship may get on shore, and lie on sand without any danger to the machinery outside the vessel, and that is to be reckoned as one of its advantages. In all these things I think Mr. Quick is taking a line which will, I hope, lead him to a thorough study of the question of stopping leaks. We have done that very efficiently at sea formerly, when we did not expect any such large holes in the ship's bottom, but there may be no doubt means devised for making canvas more water-tight than it is under such pressure as that. Although canvas answers absolutely well up to a certain pressure, there is a pressure beyond which the water is forced through the canvas, and that would be speedily reached with such depths of leak and such weights to support as might now occur. Some people think that the use of india-rubber may be possible, but I distrust it very much where it is alternately wet and dry. Vulcanized rubber is subject to decay, to slow oxygenation of the sulphur used which decays the whole rubber, and you cannot preserve diving dresses in hot climates unless you keep them always under water. And then they are subject to another slow decay, which is the combination with hydrogen, but it is slower than the oxidization. I can only express my high appreciation of Mr. Quick's paper, and

service at the present time, giving his thoughts such a practical direction as Mr. Quick appears to have done. I wish him every success.

Captain BURGESS: If you look at the proceedings of Lord Dufferin's Committee, on "Designs for Ships of War," you will see that that Committee strongly recommended that further trials should be made with the turbine propeller, and Admirals Elliot and Ryder in their Report did the same.¹

The CHAIRMAN: I am sure that I feel very much, as all of us do, indebted to Mr. Quick for having brought the subject so well before us. That the turbine principle has not been properly tried, I am convinced. I have only seen one vessel, and from what she did, or rather what she did not do, I had my doubts as to whether she was in that condition in which she might have been. We find now that a better arrangement might be made, and I think there is a great deal that can be done with the turbine; but it is all in the working out of the principle. I do not think the "Waterwitch" was sufficiently fitted, and therefore it was not a very fair trial, on the whole. I very much regret that the system has not been tried more, and more with the view Mr. Quick now advocates, because there are many other ways, as gentlemen have stated this evening, in which it may be most useful. I can conceive, in action, it is less liable, by far, to be disturbed by the accidents inevitable in a naval fight. Though it may not possibly (I am not quite certain it would not) give the same speed under the varying circumstances of wind and weather, apart from other considerations, as other methods of propulsion, yet if it will give us that speed, or something like it, under the circumstances in which these other means of propulsion will be liable to be disabled, then it will certainly be a very valuable thing. With respect to pumping, I do not see its application quite to extinguishing fire, but for pumping out from a leak, I see very great possibilities indeed, provided we have an instantaneous means of efficiently shutting off the supply to the turbine, and of taking that supply from the leak. These are questions of fitting, and it is, after all, on the accuracy of these fittings that all these new inventions depend. A new invention which is not well looked after, and which is not very well fitted, has very little chance, I won't say merely with the Admiralty, because, after all, the Admiralty are only representatives of public opinion in the Navy, and in general I may say this for the Admiralty, though I am not in any way connected with it, that they have rather a hard task sometimes to fulfil, with respect to inventions, and first of all, to see that they are likely to answer. Everybody who knows anything of Admiralty business knows that there is far more business than any number of men can do efficiently in that building, and a great number of inventions are brought before them, and they have a very difficult part to play to know what to do with those inventions. It is not every man that can immediately see, in the midst of his many official duties, how a certain invention may turn out, particularly when it has not been very effectively brought before him; so that we must not be too hard upon the gentlemen sitting there, whose time is very much occupied in the public service of the country, and who have scarcely time to attend to the wonderful and numerous inventions that are cropping up every day before us. In short, not being an office man myself, I can quite feel for them, and we must not deal too hardly with them. I do sincerely hope, after this paper and the renewed attention that has been given to the subject, they may be induced to take the question up again, and give it a chance of developing itself and showing what may be made of it. I feel convinced myself much more may be made of it than has yet been done by the "Waterwitch," and I only wish it may be tried.

¹ It appears pretty clear that had the "Vanguard" been constructed on the elaborated cellular system, so strongly recommended by the above Officers, and had she had in addition a turbine propeller, she would have been afloat now.



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The CHAIRMAN: I am sure that I feel very much, as all of us do, indebted to Mr. Quick for having brought the subject so well before us. That the turbine principle has not been properly tried, I am convinced. I have only seen one vessel, and from what she did, or rather what she did not do, I had my doubts as to whether she was in that condition in which she might have been. We find now that a better arrangement might be made, and I think there is a great deal that can be done with the turbine; but it is all in the working out of the principle. I do not think the "Waterwitch" was sufficiently fitted, and therefore it was not a very fair trial, on the whole. I very much regret that the system has not been tried more, and more with the view Mr. Quick now advocates, because there are many other ways, as gentlemen have stated this evening, in which it may be most useful. I can conceive, in action, it is less liable, by far, to be disturbed by the accidents inevitable in a naval fight. Though it may not possibly (I am not quite certain it would not) give the same speed under the varying circumstances of wind and weather, apart from other considerations, as other methods of propulsion, yet if it will give us that speed, or something like it, under the circumstances in which these other means of propulsion will be liable to be disabled, then it will certainly be a very valuable thing. With respect to pumping, I do not see its application quite to extinguishing fire, but for pumping out from a leak, I see very great possibilities indeed, provided we have an instantaneous means of efficiently shutting off the supply to the turbine, and of taking that supply from the leak. These are questions of fitting, and it is, after all, on the accuracy of these fittings that all these new inventions depend. A new invention which is not well looked after, and which is not very well fitted, has very little chance, I won't say merely with the Admiralty, because, after all, the Admiralty are only representatives of public opinion in the Navy, and in general I may say this for the Admiralty, though I am not in any way connected with it, that they have rather a hard task sometimes to fulfil, with respect to inventions, and first of all, to see that they are likely to answer. Everybody who knows anything of Admiralty business knows that there is far more business than any number of men can do efficiently in that building, and a great number of inventions are brought before them, and they have a very difficult part to play to know what to do with those inventions. It is not every man that can immediately see, in the midst of his many official duties, how a certain invention may turn out, particularly when it has not been very effectively brought before him; so that we must not be too hard upon the gentlemen sitting there, whose time is very much occupied in the public service of the country, and who have scarcely time to attend to the wonderful and numerous inventions that are cropping up every day before us. In short, not being an office man myself, I can quite feel for them, and we must not deal too hardly with them. I do sincerely hope, after this paper and the renewed attention that has been given to the subject, they may be induced to take the question up again, and give it a chance of developing itself and showing what may be made of it. I feel convinced myself much more may be made of it than has yet been done by the "Waterwitch," and I only wish it may be tried.

¹ It appears pretty clear that had the "Vanguard" been constructed on the elaborated cellular system, so strongly recommended by the above Officers, and had she had in addition a turbine propeller, she would have been afloat now.



Fig 1.

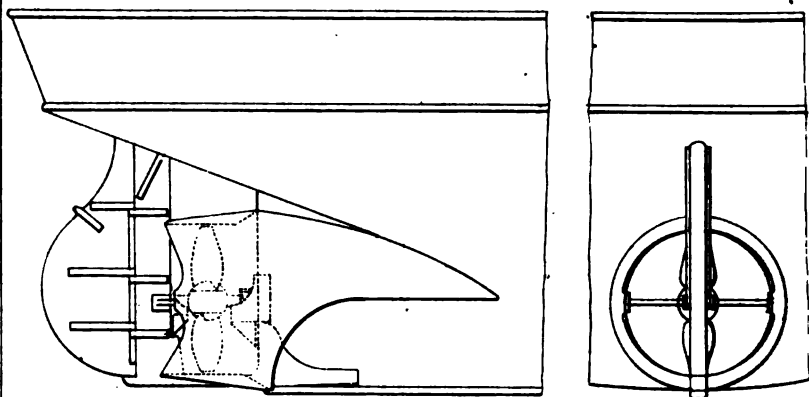
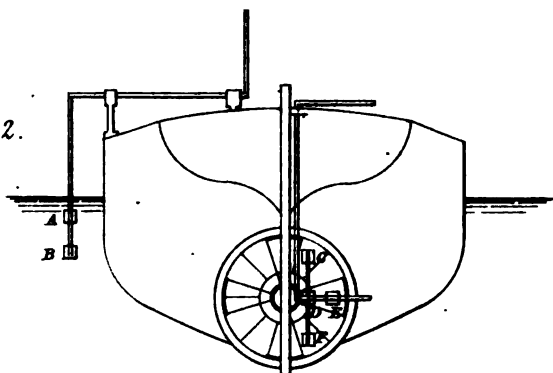


Fig 2.



Curve of requisite Supply of Water
for Screws in Casings.

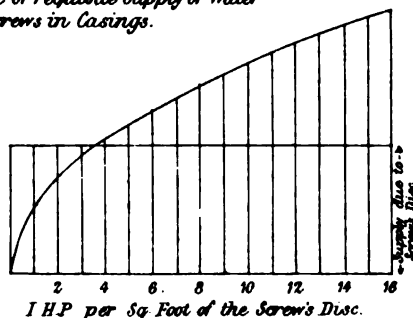


Fig 3.

ON THE CASING OF THE PROPELLER OF H.M.S. "BRUISER."

By R. GRIFFITHS, Esq., C.E.¹

THE plan of casing the screw propeller has often been proposed and practically tried by several inventors, but caused in every case a loss of speed, which could not be accounted for at the time; in some of the experiments the casing was attached to the periphery of the screw, and revolved with it; and, in the others, the casing was fixed to the ship, and the screw revolved in it; but in each case I found, by experiments I made, that the loss of speed was due to the screw being short of water, when the casing was only made the length of the screw, for a considerable portion of the water that the screw-propeller forces through its disc is drawn into it from around its periphery; so that when the screw had a casing over it, it was deprived of all its supply, except that which entered on the face of its disc.

There has been—I may say universally—an opinion, that whatever the distance gone by the ship, was short of the distance the screw would have gone if it had been working through a solid, which is termed the slip of the screw, was a loss of power; and there have been several papers read at different Scientific Institutions to attempt to prove this theory. I have always opposed this theory, for I saw in 1849, when I made my experiments on screw-propulsion, that the water was forced back from the screw at nearly twice the speed the model was moving, and that the model would not move forward unless the water was forced backwards from the screw's disc. In order to give the screw of the "Bruiser" its full supply of water, I had the casing made of boiler plate of 7 feet diameter where the screw worked, and tapered to 6 feet 2 inches diameter at the after end; it was lined inside with wood, making it parallel where the screw worked, and tapered from the forward edge of the screw to form a funnel mouth, which gave about 35 per cent. more entrance for the water to get to the screw; when finished it did not appear to allow as much extra entrance for the water as I imagined to have given the best results in my model trials; I therefore had a lip of plate iron attached below the casing, allowing about 5 per cent. more, making altogether about 40 per cent. more entrance for the water to supply the screw than the area of the screw's disc. This I found since to be little more

¹ Read at the Evening Meeting on Monday, 31st January, 1876. Admiral Sir Henry J. Codrington, K.C.B., in the Chair.

than is required for a screw that has only 7 I.H.P. per square foot of the screw's disc, which was the proportion in the "Bruiser;" for the supply of water requires to be in proportion to the power exerted on the propeller, as shown by the diagram, Fig. 3; hence a small screw can be made as effective in propelling as a large one within certain limits, if it can obtain a sufficient supply of water. A screw propeller is simply a rotary pump, when in a casing, and is governed by the same laws, viz., that the power varies as the square of the velocity, so that to double the velocity of the water you drive through a pipe, or through the casing of a propeller, you require four times the power, and four times the thrust is given to propel the ship.

Diagram No. 2 is that of a steam launch with which I tried some experiments at Devonport, with a view to ascertain the quantity of water the screw required. These experiments showed that when the launch was moored, and the engines worked up to the same speed as when she was going—viz., 240 revolutions per minute—the force of the water which came from the screw, gave about one-half the pressure upon the gauge-plate as it did when the launch was going at the full speed of six knots, with 240 revolutions per minute. This shows clearly the mistake of the theory of engineers that when the screw was placed where the water had free access to it, the quantity driven back would be a column the same diameter as the screw at the speed the launch went; for these experiments show it to be about 50 per cent. more.

One of the most important points in screw-propulsion is to get a sufficient supply of water to feed the screw in proportion to the power that is exerted upon it. On the present system this is all taken from the stern of the ship in front of the screw, and as the ship moves forward, the water must close in behind her in order to fill up the space she occupied, and the screw is drawing away the water from where it is most required, and thus causes much greater resistance to her than if she were propelled by sails or paddles; and this resistance increases in proportion to the power and speed of the ship. It is well known that out of the power exerted to propel a ship by the screw, there is about 60 per cent. loss, so that 40 per cent. of the power, if exerted to tow her, would give the same speed to the vessel. I have tried the model which I use for my experiments, and with the spring which took one minute to propel it 60 feet, with 600 revolutions by the screw, it was towed the 60 feet in 33 seconds, with 600 revolutions, by a string wound on a drum, the friction being the same in each case except the friction of the screw in the water, which must be considerable.

In order to reduce this enormous waste of power in propelling by the screw, I have devoted a considerable amount of time and money, and the conclusion I have arrived at is that, unless the screw gets *fully* supplied with the water it requires to drive through in proportion to the power exerted by the engine to work it, it will not give a relative thrust to the screw-shaft for propelling the ship; and, in order to obtain it, I have been able to discover no better way than to enclose the screw in a casing made with a funnel-mouth at the entrance, of such proportions

as will admit the quantity of water which will be required, according to the amount of power that is to be exerted upon it.

There is another important feature in connection with the supply of water to the screw,—viz., the use made of it after it has passed through the screw, as well as where it obtains its supply from; for I have already observed that the screw in drawing the water from the stern of a ship causes much greater resistance to her; and I find the water should be supplied to the tunnels from underneath the vessel, as far forward as not to take it from or stop the supply that is required to fill the space that has been occupied by the ship, and delivered from the screws into the space left by the stern of the vessel; and as I have already shown that the screw delivers from 30 to 100 per cent. more water than is due to the speed of the ship, according to the power exerted to work it, so must her stern be made full to leave room for it as it leaves the casing and propellers, and in that case I find there will be very little disturbance caused by the screw in the water behind the stern of the ship when under way.

The speed of the "Bruiser" when tried before the casing was applied, was 8·016 knots, and with the casing 8·280 knots; and I find from experiments that I have made since, that if the casing had been made to come down level with the keel, and the stern made full as shown on this model, I have no doubt the speed would have been at least one knot more.

The advantage of casing over the screw as a protection to it, will be generally admitted both for ships of war and for merchant vessels. I do not think that screws in general get injured or broken unless they come in contact with some foreign substance, or the ship is pitching in a heavy sea; and no doubt many of the ships that have been lost and never heard of, as well as those that were known to be wrecked through the breaking of their propellers, would have been saved had their propellers been protected; and I have no doubt that the day will come when the Legislature will not allow ships to carry passengers unless they are propelled by two or more protected screws and separate engines.

Another great advantage which was observed in the "Bruiser" was the entire removal of the disagreeable vibration, as well as the saving of much wear and tear, caused by it to the ship and machinery. The application of the casing over the screw of the "Bruiser" entirely prevented the racing of the engines when in a heavy sea, the trouble and anxiety caused by which is known to every marine engineer, as well as the loss of speed from the screw losing its hold on the water.

In conclusion I would remark that any improvements that were to be made in screw-propulsion, were expected by engineers and ship-builders to be made in the screw itself. A greater mistake could not have been made, for there has been no real improvement made in the screw when worked in open water since the alteration made twenty-five years ago in its form in contradistinction to the system of making the centre or boss as small as consistent with strength, and the blades narrower towards the root than at the extremity. The placing of the screw in a tunnel I find requires it to be made nearer to the old form

of a small boss, and blades wide at the extremities. The screw of the "Bruiser" had a large boss and blades narrow at the extremities, and a little more speed would have been obtained if the screw had been altered, but if this had been done in the "Bruiser" it could not have been proved whether the improvements were due to the alteration of the screw or to the casing.

There is one remarkable fact, that Mr. Watson, the chief engineer of the "Bruiser," noticed that when the ship was at sea in clear water, the water was forced back in a column from the casing for a considerable distance without any perceptible increase in its diameter. The same thing occurs with my models when the screw is only enclosed in a metal casing; but in the model with a full stern, which gives the best results by far, this does not occur, as the water delivered from the screw stops at the stern, merely agitating the water there; neither does the stern drop when going at full speed, which is the case in fine-sterned launches, which is entirely due to the screw drawing the water from under the stern.

I am now engaged in making some interesting experiments upon some improvements in screw-propulsion, and the proportions, &c., of screw ships. When they are completed, I shall feel great pleasure in communicating the results to this Institution, should the Committee desire it.

Diagram No. 1.—Represents the stern of Her Majesty's ship "Bruiser," as fitted with the casing over the propeller.

Diagram No. 2.—Shows the stern of Her Majesty's steam-pinnace, No. 22, with a casing over the screw, and fitted with apparatus for showing the pressure of water at different places behind the screw, and over the boat's side, which consisted of a 3-inch square plate attached to the lever as shown; the pressure was taken by a Salter's balance attached to the arm over the boat. The following table gives some of the results:—

Speed of boat about 6 knots in each case.

Pressure on plate, 9 square-inch area at A	5.7 lbs.	
" " " " " B	7.7 "	
		Screw working.
" " " " " C	9 lbs.	Screw disconnected,
" " " " " D	18 "	Boat towed.
" " " " " E	18 "	7 lbs.
" " " " " F	16.5 "	7.5 "
Revolutions of screw	240 "	5½ "
		9 "
		120 "
		Launch moored.
—	C	—
—	D	5 lbs.
—	E	6 "
—	F	—
Revolutions.....	240	Screw working.

About 70 per cent. more water passed through the casing when the launch was going, than when moored and the screw working.

Diagram No. 3.—Is a curve, showing the requisite supply of water

for screw-propeller and in casings, with various proportions of power, the extra supply being obtained by means of a funnel-mouth attached to the casing.

The launch (fig. 2) had a speed of six knots, at 240 revolutions a minute. When the screw was working, and the boat under way, the pressure at C was 9 lbs., at E and D 18 lbs., and at F 16.5 lbs. When the launch was towed at that same speed by another ship, the pressure at C was 7 lbs., at E 7.5 lbs., at D 5½ lbs., at F 9 lbs. In each case the revolutions made with the screw disconnected were 120, exactly one half what it did when it was driven by the engines. I think that is a point that has never been studied in the screw propeller before, nor given to the public in any case. When the launch was moored and screw working, the pressure at D was 5 lbs., and at E 6 lbs. The engines were going at the speed of 240 revolutions. (The CHAIRMAN: Moored by the stern?) Moored by the stern. In trying my models, I made a valve to shut up the aperture that admitted the water to the screw entirely, and opened a valve to admit the water that was inside the ship, the water then went in here (pointing), and the screws going drew all the water out of the ship directly, propelling the ship just the same.

Captain J. C. WILSON, R.N.: Very much the turbine principle, applied direct.

Mr. GRIFFITHS: The screw is nothing but a rotary pump, when enclosed in a casing.

Mr. WILLIAM SMITH, C.E.: I should like to ask Mr. Griffiths how the results to which he referred square with those made by Mr. Froude? Mr. Froude had made a number of experiments on the difference of the strain on a supposed block by the power transmitted through the screw, propelling the vessel at a given speed, and her being towed, and also from her being moored astern. I think he made a very exhaustive series of experiments—the first of the kind ever made.

Mr. GRIFFITHS: In those experiments, the object was to ascertain the quantity of water the screw required to work it, with the object of gaining the best results.

Admiral SELWYN: I think if Mr. Quick¹ had been here, we ought all have congratulated him on the fact that has come before us, that one of the oldest experimenters on the screw has very nearly arrived at the conclusion that, to make a thoroughly efficient screw, it is requisite to bring it almost into the condition of a turbine, and, if that be so, it will aid us very much in considering the whole question. It is quite possible we might find the turbine placed in some way as Mr. Griffiths has got it, more effective in some ways than discharging at the side of the ship. It will certainly take less room. The point to which attention ought to be called, is that the experiments Mr. Griffiths has given us, seem, as yet, to be rather begun than finished. I think you promised us more experiments, and you supposed the best results would be attained from a still greater prolongation of the casing.

Mr. GRIFFITHS: I proved that the casing ought to be brought down so that no water goes in from the side; if the water goes in from the side, it is sucked away from the stern of the ship.

Admiral SELWYN: I have often had reason to remember the trials made, many years ago, in the thickening of the run of a vessel, which bore very much on the question of bringing the greatest quantity of water possible to the screw. The "Teaser," and one or two other vessels, were doubled under the run with planking, and it produced a most remarkable decrease. Every inch of planking put on to the run of the vessel decreased nearly a knot an hour of the useful result. It was equivalent to just what we had in some of the early armoured vessels. The "Meteor," and others, were square vessels, like square boxes, an imitation of the Emperor Louis Napoleon's first armour clad. The run did not exist at all. The three small screws with which they were propelled were stuck practically behind a square box, and, under these circumstances, it will not surprise engineers to hear that they showed very little efficiency indeed. Here there is a very great advantage also to be found in the fact that the screw will derive great protection

¹ Engineer, R.N., a paper by whom, "On a proposed Combination of Propellers for Ships of War," had been read previously.

from floating wreckage, which is one of the objections we have to it, looking forward to naval combats. Although I am an advocate of the most advanced means of propulsion, I do not neglect any means which will make those which we have either more efficient or less liable to damage. I am quite sure Mr. Griffiths' experiments, in this direction, will have a legitimate result. I am afraid the Legislature is scarcely likely to interfere so rapidly as he thinks; they have so much to do one way and another that they are very little likely to take so much care of passengers as Mr. Plimsoll would desire. I have often noticed, in those large ships of the Inman and Cunard lines, that there is a remarkable driving of the water away from the stern, and a disturbance of the water which ought not to take place, if the screw was thoroughly and efficiently doing its work. If Mr. Griffiths can do away with that in any manner, and give us less racing in any manner, I am quite sure every naval engineer will give him a cordial vote of thanks.

MR. H. BOWLBY WILSON: I have recently made a voyage in a ship that has a screw made to drop below the keel of the vessel—the ship "Britannia." The screw was working 16 feet below the bottom of the keel, and we made an exceedingly fine voyage; she performed remarkably well. But the ship has been taken off and something has been done to the screw, which seems to suggest that there must be some practical difficulty to be overcome. Perhaps Mr. Griffiths can throw a little light upon it. I should just like to sustain the observation made by Admiral Selwyn that the fineness of the run of a ship is just as important in the replacement of the water as the fine lines are in its displacement. I have taken considerable part in the discussions that have taken place in America on questions of this kind, and I have invariably found that my own experience and observations on the performance of vessels carries out exactly the fact as stated by Admiral Selwyn,—that in order that the screw shall work efficiently, it is necessary for the lines of the run to be equally fine with those of the entrance. I would remark in respect to the performance of the screw in the "Britannia," that I experienced a slight tremor all the time, which I imputed to the circumstance that it was not working in a horizontal position with the keel. There was a slight lifting motion. I went repeatedly to the extreme stern of the ship, and felt the shaking motion continually. We made one of the quickest voyages on record; our average speed was 16 knots per hour till we arrived at Queenstown, but we had this continual motion. I discussed the question with Captain Thompson, who declined to explain what his ideas were in respect to the difficulties, but he said they would be cured, and I hope they will be.

Captain WILSON: I think the gentleman who has just spoken has rather strengthened Mr. Griffiths' hands by what he has said. I think Mr. Griffiths does not propose to make any particular alteration in the run of the ship.

MR. GRIFFITHS: Oh, decidedly: making it full. I come to the old style of ship.

Captain WILSON: You draw your water from underneath, and I suppose the effect is very much the same. You simply confine the water by taking it from underneath the casing; therefore I suppose the results are very much the same, excepting that you give the ship more buoyancy about the stern by drawing the water from underneath, instead of taking it away from under the counter.

MR. GRIFFITHS: There is another point. If you do not make her with a big stern, the water is forced away from the screws in a line, and draws the other water with it; whereas, if the stern is full enough to take all the water that comes from the screw, it does not force the water back at all—it merely fills the place as fast as the ship goes along.

Captain WILSON: The weak point in all our armour-plated ships at present is that the screw is insufficiently protected, and in anything like a heavy sea they would be liable to damage from shot, even in engaging a wooden ship at long range. It would be a great advantage to be able to case in your screw, not only for speed, but for security. (MR. GRIFFITHS: It is perfectly secure.) It would not be so vulnerable in case of an attack, and would not be so liable in action to become fouled by floating wreck. You may remember that very curious little incident (I do not know whether it has ever been noticed in this Institution) which occurred in the German and French war, where we saw the advantages and disadvantages of masts and sails in war. In a little action which occurred off Havanna between a German and a French gunboat, the German gunboat lost her mizen-mast; the consequence was the wreckage fouled

her screw, and the screw was disabled. The Frenchman tried to run her on board, and as she came up close to her adversary she received a broadside, which cut her steam-pipe in two, and so was disabled. She immediately made sail, and escaped into neutral waters before the German had cleared her screw. If the German screw had been cased, she would have been able to have taken the Frenchman. We know that screws are very easily disabled, and we know the case of the "Alabama," where the "Kearsage" was successful in sinking her; that it was a mere chance that the "Kearsage" was not herself taken instead, as a shell from the "Alabama" was imbedded in her stern-post, and had it exploded it would have smashed her screw to pieces. If a shell can lodge in the stern-post of a ship, it might strike the screw and knock it to pieces too. Therefore I think it is of importance that the screws should be cased, in looking at it even from that point of view. As to whether it would add very much to the speed of a ship, Mr. Griffiths is a much better judge than most of us here present.

Commander C. F. W. JOHNSON, R.N.: Mr. Griffiths has claimed one advantage for his invention upon which I should like to ask him a question. He says, if he closes the aperture in the fore end of his casing in the event of a leak (provided, of course, there is some means of allowing the leakage to come to his screw), the water would be taken out of the ship by the screw, and the ship still propelled. Might not that advantage be influenced to a certain extent by the position of the leak? Take the case of the "Royal Albert," in the Mediterranean, during the Crimean War. The packing in her stern tube came loose, and she had to be run on shore to save the ship. Supposing such an accident as that to occur in a ship fitted with Mr. Griffiths' invention, would the advantage hold good; would the screw, under those circumstances, keep the water out of the ship?¹

MR. GRIFFITHS: I only tried it on the small model, which worked the water out and propelled the ship just the same; if there is depth enough of water in the ship to cover the aperture it will go right out directly. It must go out. It is nothing but a centrifugal pump when in a case, and it cannot help but take it out.

Commander JOHNSON: That would be a very valuable advantage; it is an accident which has frequently happened to screw ships, the packing of the stern tubing coming loose. In such a case the invention in itself would be a very great advantage.

MR. GRIFFITHS: I think it is worth trying in some of our ships, since they run the risk of being run down. I think if the hole is only just the diameter of the screw, the screw would take off all the water working at full power; you have the full power of your engines pulling at it, and the speed of the ship keeps on all the same. It does not matter at all where the water comes from if you have an opening for it to go to the screw,—shut one opening and open the other.

MR. SMITH: To do that I think you must be provided with another invention, that of shutters.

The CHAIRMAN: I think with respect to the "Royal Albert" nothing of the screw propeller's action would have answered in the absence of shutters. In fact, after the accident, she did steam as hard as she could into a little nook in the Archipelago, in the island of Zea, I think, and ran on shore on the beach, but even then the water had risen in spite of this supposed action of the screw, up to such a height, that it was quite time she was on shore to be safe. I can perfectly see that the collecting of water for the screw from beneath the bottom of a ship in motion is a very efficient way of getting more speed. Anybody who has looked over the stern of a ship merely passing through the water will see that things of medium weight

¹ This question I asked, because it appeared to me that the force of the screw thus directed in the case of the "Royal Albert," and of the "Ajax" (of Holt's line) in the Shanghai river (and other cases similar to these) would *only* keep the water out; and failing a supply from forward, would *not* propel the ship. In the other case of a leak forward of the screw, the same force which would be pumping the water out, would also appear to be pumping it *into* the ship.

It is also a grave question, whether the fires could be kept in under such circumstances, to move the engines.—C. J.

thrown overboard from the head, will invariably rise to the surface of the water at the rudder. The water to fill up the vacuum made by the ship while moving ahead, mostly comes from the bottom and not from the sides; on account of the increased pressure of the water from that depth it is more easy for it to rise up than to come from the sides. Therefore it is merely facilitating a good supply to take it by that casing. In this as in all things we must look at practical results. How is this casing to be secured to the ship's bottom so as to be free from accident and not be a source of danger in itself? It may involve difficulties which perhaps Mr. Griffiths has not contemplated, and which would be found in use, which we must make our minds up to, if we are to take up the invention. Whether we believe in all the details given by Mr. Griffiths or not, we must be very much obliged to him for the paper he has given us, and for the new ideas he has brought forward. There is a great deal of what is good in it, but I should hope to see it freed from the danger there might be in it. At any rate we all thank Mr. Griffiths for his paper.

Mr. GRIFFITHS: There is no occasion for casing at all; the ship can be built in an ordinary way with a hole underneath for the water to come in at. The casing is merely a temporary arrangement for ships now built. It does not follow that we want any casing whatever in new ships, but we should have the tunnel constructed within the ship, and nothing would be seen outside except the aperture for the discharged water from the screw.

LECTURE.

Friday, March 3rd, 1876.

Field Marshal H.R.H. the DUKE OF CAMBRIDGE, K.G., K.T., &c., &c.,
&c., &c., Commanding in Chief, President of the Institution, in the
Chair.

CAVALRY.

By Major FRANK S. RUSSELL, 14th Hussars.

YOUR ROYAL HIGHNESS AND GENTLEMEN,
I HAVE been asked by the Council of this Institution, to give a lecture on "cavalry tactics," a subject which, however interesting to cavalry soldiers, would at first sight appear to be somewhat dry and uninteresting to the other arms of the profession and to the general public.

I think, Sir, however, that when we enter into the subject and analyse it, we shall find it of great importance and of special interest, more especially as up to the present time it has failed to receive that amount of attention which I feel it deserves.

From the date of the first improvements in rifled firearms down to the French and German war, there was an universal tendency throughout Europe, to decry cavalry and to declare that the time was gone for it again to play an important part in war. Strange to say this tendency to depreciate the arm, which above all others requires the most care and labour to bring it to perfection, has reappeared from time to time ever since armies first came into existence and has invariably been accompanied by a general decadence or falling off in the science of war. If we study the history of cavalry from its earliest days, we shall find that at every period of the world's history, when military art has attained any pitch of excellence, cavalry has invariably been much developed and has been most sedulously cultivated.

The history of the world is marked out in periods or eras, with each of which is associated the name of some chief or conqueror, who by superior ability, organization, or opportunities has handed down to posterity a great military reputation. Strange to say, the name of each one of those, almost without exception, is also associated with the special excellence of the cavalry he commanded. To begin from the

earliest times, Sesostris, the first great Egyptian monarch of whom we have any authentic record, who lived many ages before the Trojan war, and who may be said to have been at that period the greatest ruler of his day, is stated by all contemporary writers, both sacred and profane, to have been the founder of regular cavalry; and the prophet Isaiah mentions that the Egyptians were the best horsemen of the world. It is a curious circumstance that the first time light-cavalry is spoken of, it is with reference to a corps of Amazons mentioned by Herodotus, and of whom Hippocrates also speaks, explaining how he performed an operation on their breasts in order to enable them to use the bow and javelin.

After the decline of the Egyptian power, Philip and Alexander of Macedon may next be said to have been the most renowned conquerors who have left their mark on history, and both have been specially noted for the perfection to which they brought their cavalry, to whose excellence indeed they owed most of their victories. The exploits of Alexander's horsemen, more especially at the battle of Arbela (B.C. 331), may well serve as an example to us at the present day. Not only did they defeat their enemy on the battle-field, by brilliant flanking movements combined with sudden deployment, but they pursued him after defeat, 75 miles in 24 hours.

I fear, however, that my allotted time and your patience would alike fail me were I to enumerate the various great conquerors in history, who have also been distinguished cavalry leaders. It is, however, impossible to omit Hannibal in ancient, and Frederick the Great, in more modern times. Hannibal entirely owed his successes over the Romans to his cavalry; and of twenty-two pitched battles fought by Frederick and his generals, fifteen were decided by cavalry. Our own General Marlborough won his two greatest victories, Blenheim and Ramillies, by the timely and efficient action of his horsemen.

After the invention of gunpowder, there was the same tendency to decay cavalry as existed when the latest improvements were introduced into rifled fire-arms. I remember, when I first joined the army, an enthusiastic instructor of musketry proving to me, as he thought, conclusively, that if I ever attempted to attack infantry, I must inevitably be killed at least four times over before I could hope to reach them; and he explained that hence I had better exchange into some other more useful and less dangerous arm of the service. I have no doubt that the enthusiastic musketeer of the 16th century used the same arguments to the ponderous and slowly moving horseman of his time. Charles the Twelfth of Sweden, however, and Gustavus Adolphus soon demonstrated that the days of cavalry, so far from having gone, had scarcely arrived, and that then, as now, although their tactics must be altered to suit the requirements of the time, the importance of their mission remains the same. But as remarked by Captain Nolan, great and successful as were the achievements of the Swedish and French cavalry in the 17th century, they could in no way compare with the Turks who first showed Europe what might be done by cold steel, coupled with extraordinary rapidity of movement. It is a remarkable fact that the Turks obtained a more complete mastery over infantry than any other

cavalry have ever done. In fact the Russians habitually made use of *chevaux-de-frise* to protect themselves, and each battalion had two light carts attached to it in order to carry these obstacles. It was mainly the example of the Turks that first led European Commanders, and notably Frederick the Great, to adopt the only system of training and tactics that can ever render cavalry formidable in war. They shewed that the first requisite is to make a horseman master of his horse, and that unless cavalry are accustomed to move rapidly, they surrender all the advantages of being on horseback without having any of the benefits of being on foot.

After the death of Frederick the Great, it may be said that the sun of the cavalry service set and only rose for a short time and with diminished brightness in the days of Napoleon. That great conqueror, like every other great conqueror, owed many of his victories to the action of his cavalry both off and on the battle-field; he also, like Caesar and Alexander, was checked in his career of victory by the want of cavalry; as he, himself, said at St. Helena, had he possessed cavalry after Lützen and Bautzen, the 1813 campaign would then have been ended, neither Leipsic nor Waterloo would ever have been fought. Of the many losses that the Russian war entailed on him, the annihilation of his cavalry was the most serious. He appeared at the head of another army by next spring, but he could not re-create a force of cavalry in a few months, and to this may be traced all his subsequent misfortunes.

From the fall of Napoleon down to the present day, cavalry has in no way had that relative importance, or received that attention which it deserves. In the long peace this was not astonishing, and the wars that followed, from their character did not illustrate the mission of cavalry. The Crimean war was a siege, the Italian campaign of 1850 took place in a country peculiarly unsuited to mounted arms. We next come to the war of 1866, and here for the first time we find the cavalry-arm regaining that importance which it once possessed; but even then it cannot be said to have been used with full effect or brilliancy. As remarked by the author of the *Tactical Retrospect*, the Prussian cavalry was notoriously mismanaged. The Austrians were far more efficient both on the battle-field and off it. It is now proved that General Benedek had full information as to the movements of his enemies, and the way in which the Austrian retreat was covered after Koniggratz may well serve as a model for all cavalry leaders to the end of time.

The events of the late war are so recent that it seems unnecessary even to allude to them. We all know that the lessons learnt by the Prussians in 1866 were not thrown away. We all know that the admirable manner in which the duties of outposts and reconnoitring were performed, conduced more than any other cause to the success of the campaign. It seems that but little additional can now be learnt as to the employment of cavalry off the field of battle. All that is required is, to put in practice the rules and principles of bygone days, practised in the days of Frederick the Great; by our own cavalry in the Peninsula; by Napoleon in his earlier wars, as long as he had any cavalry worthy

the name, and now again revived, it is hoped never again to be forgotten.

It cannot, however, be said that we have in any way got to the bottom of the problem as to how cavalry may be best employed in action, or that the last war has done much to enlighten us. The history of the French cavalry in that campaign has proved to us now more than ever, that there is no quality in a cavalry Officer so fatal as bravery, unless it is tempered with discretion. We know how the magnificent regiments that in former days we used so justly to admire in Paris were absolutely annihilated within a few weeks of the declaration of war—not only annihilated but needlessly sacrificed—fruitlessly thrown away. Nothing could exceed the bravery of Bonnemain's Cuirassiers, who charged through the vineyards at Wörth, or of those Lancers, who being kept all day under fire, lost nearly half their Officers and men without even themselves coming into action. The charges of the Chasseurs d'Afrique down the slopes of Sedan, like our light cavalry charge at Balaclava, were lamentable examples of what brave men will do, but what they should never be asked to attempt.

I think no one can read the history of the French cavalry during the late war without feeling that ignorance, dangerous at all times, is doubly so in a cavalry leader. The responsibility of an infantry General is great when he comes into action, but of a cavalry General how much more! There is no time to correct an error, no time to consult or advise; in one short moment the training and study of years must be turned to account; in one short moment victory may be lost or won. And yet, Sir, I believe it has been said, that study of cavalry tactics is a waste of time, and labour thrown away. But although prudence and knowledge are, if possible, even more necessary in a cavalry leader than in any other, there must be also that dash and daring, which, although sometimes the accompaniment of age, is usually the attribute of youth. Seidlitz was made General of the Russian cavalry at the age of thirty. Lord Uxbridge was little over forty when he lost his leg at Waterloo. It has been remarked, and I think with great truth, that all the qualities which make a good man to hounds are those which are most valuable in a cavalry Officer. He must ride well; he must be bold and fearless; he must have a good eye and quick decision; but these qualities are even dangerous unless he also has discretion and knowledge, otherwise, like any one riding across country, he must sooner or later come to desperate grief.

It may be said, however, that we have complete examples how cavalry should *not* be used on the field of battle in the presence of breech-loaders, but have we learnt how it can be used? or whether it can be used at all? I think that in the next great European war we shall see a new phase of cavalry warfare. I dare say we all remember that last August some alarm was created throughout Europe by a report that Russia was mobilizing her cavalry. It turned out that mobilizing was the wrong word, it should have been re-organising, and that Russia was only following the example of the other great Powers, and was forming her cavalry into independent divisions along her frontier, so

that it might be able to take the field within a few days of the declaration of war.

I venture, therefore, to make a prediction, of the truth of which I am fully satisfied, although I have not seen it suggested elsewhere, I say, that within a few days after the next European war is declared, we shall hear of a great cavalry battle, which will exercise not only a great moral, but also a great material influence on the ultimate fate of the campaign. The cavalry of each combatant will press on that of the other, each will attempt at one point to tear aside the curtain before it, and the result will be a great cavalry action. The General, whose horsemen prove victorious, will not only have the prestige of an early success, but will also have the inestimable advantage, by the acknowledged superiority of his cavalry, of being able to screen his own movements, and to penetrate those of his adversary. The same is true in the case of an English army—in any expedition that we are forced to send on the continent of Europe, our independent cavalry division would inevitably bear the first brunt of battle. Here some one may remark, that in our new mobilization-scheme no provision is made for independent cavalry divisions; to this it may be replied, that the scheme, as it stands, is intended for defensive purposes, but that if an English army ever took the field, cavalry divisions would be at once organised with transport and hospital service, entirely independent of the rest of the army.

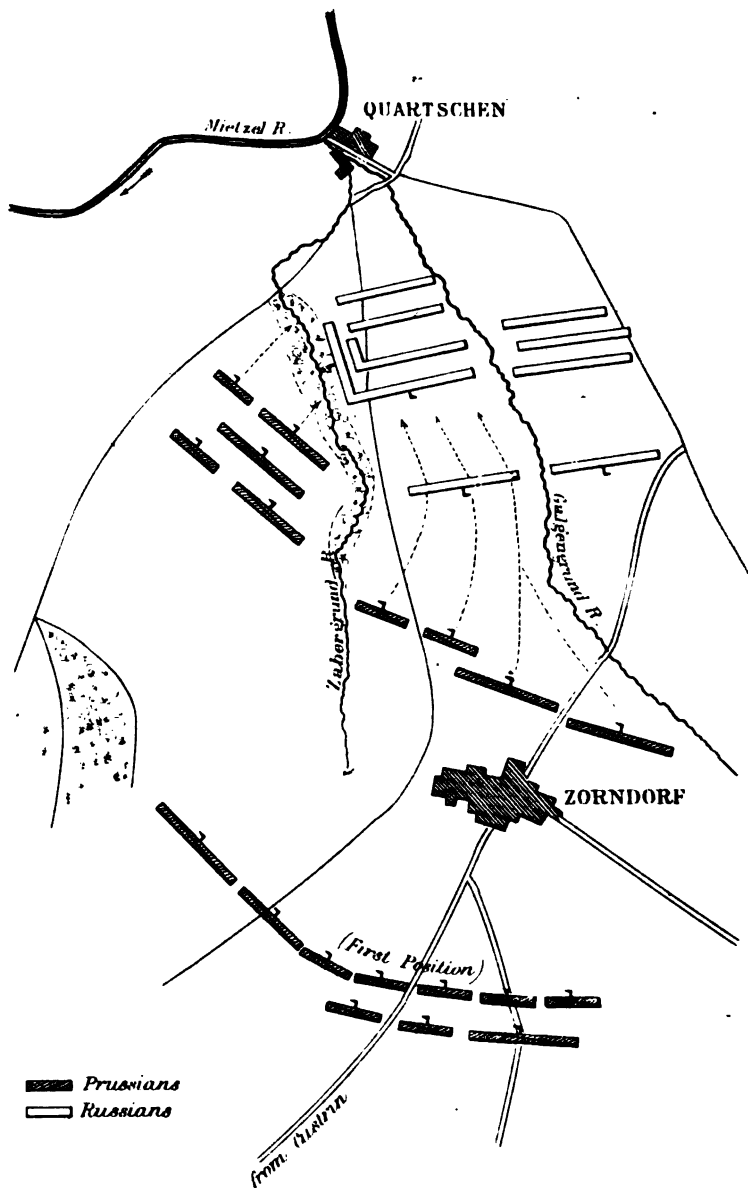
It is now therefore more than ever necessary to study and practise handling masses of cavalry in combined action. Reconnoitring and outpost duty are important—more important than ever, but they are not everything, as some time since there was a tendency to imagine. Now more than ever must cavalry be practised in combined manœuvres—now more than ever must its leaders be accustomed to handle rapidly and efficiently large bodies united under their command. In England we labour under special disadvantages, whereas on the Continent there are many large spaces of ground where masses of cavalry can be manœuvred without difficulty; in this country we have no such facilities, except perhaps on the Wiltshire Downs, and there they can only be used occasionally. However, as we all know, Aldershot and the Curragh, every year during the drill season, the advantages we possess are turned to the fullest account.

It was my good fortune last year, after the conclusion of our manœuvres, to see the Prussian cavalry manœuvres at Walsröde, in Hanover, where three brigades were exercised in a united division. At these drills there was much that was interesting, but nothing remarkably new or original. A flank was invariably combined with a front attack; three lines were habitually used, sometimes there were more, but under no circumstances was any attack made with less than three lines. I need not remark that although for some time discontinued, this habit of manœuvring with three lines is of ancient date. The Duke of Wellington wrote a letter to Lord W. Russell, in 1833, in which he remarks that cavalry, "being only useful or even safe by the employment of large reserves, it should never be manœuvred in fewer than three lines." He also makes some observations as to the

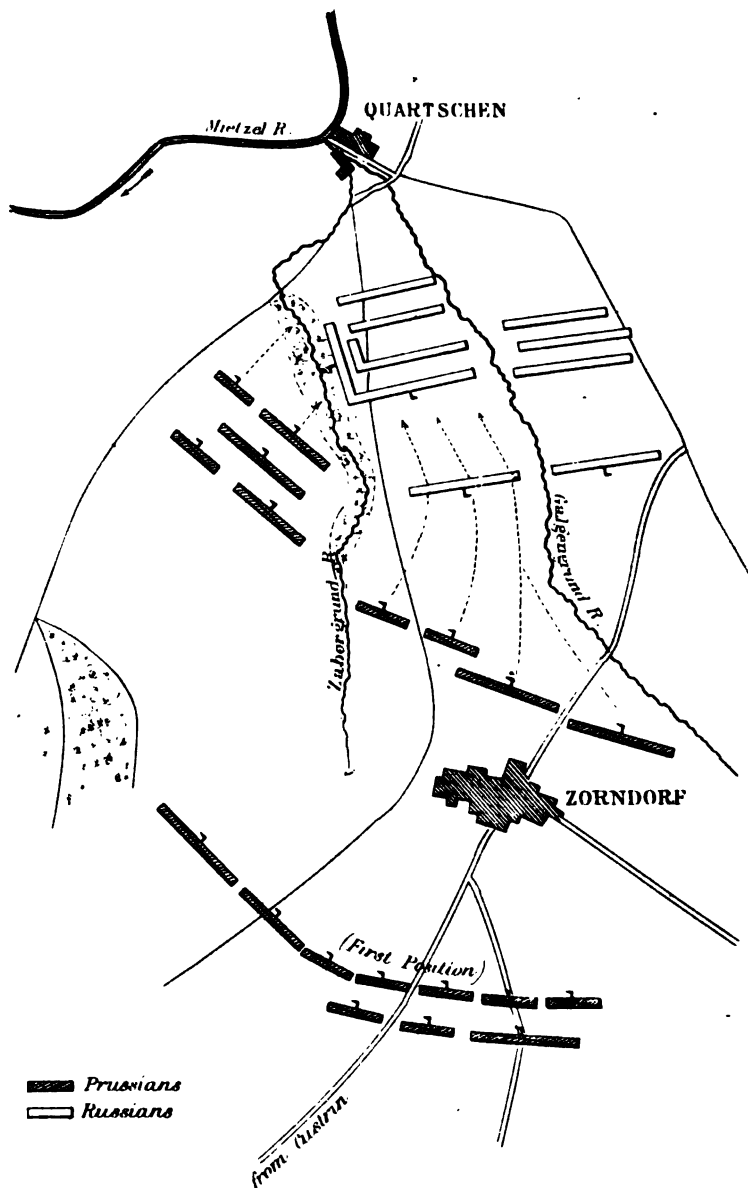
regulations, translated by Captain Trench, 20th Hussars, and is also in General Walker's pamphlet, just published, on the "Tactics and Organization of Cavalry." The first line, as you see, is deployed and is usually composed of heavy cavalry, the theory being, that they will be most effective for the first shock, whereas the medium and light cavalry can move more quickly and hence are better for flank attacks. I think it unnecessary for me to go into the details of this formation or of its advantages, these are very fully laid down in the Prussian cavalry regulations referred to, and are ably discussed at considerable length in General Walker's pamphlet. I will only remark on one or two points, which seemed to me worthy of attention. The formation in columns of division is, I venture to think, an excellent one, less unwieldy than line and capable of being immediately converted into line, it affords peculiar facilities for advances over rough ground, and is I may say alike handy, compact, flexible. It can be wheeled to either flank without difficulty, and appears to admit of more uniform rapidity of movement when an oblique direction is required than is possible when formations in line or in broader columns are adhered to.

The introduction of division drill into our service, perhaps might be inexpedient, as it would necessitate an entire change in the organization of our regiments and in the strength of our squadrons, but from what I saw of its practical working, I cannot speak too highly of it, and the best proof of its usefulness is the uniform rapidity with which regiments moved; and this, although the German cavalry soldiers, as regards riding, cannot be compared with our own. The horses, although of excellent quality and well bred, appear much overworked and all are very low in condition. There is certainly one most important point, on which I think English Cavalry Officers may most justly congratulate themselves, and that is on the admirable stable management, on the care taken by the men of their horses throughout our entire service. In Germany, although no young or unseasoned horses are ever admitted into the ranks, as unfortunately is the case in our Army, and with squadrons usually above 130 and never less than 120 strong, I never saw more than 100 horses turned out, and very often far fewer. At the same time I cannot help expressing my regret, first, that our regiments and squadrons are so absurdly weak as compared to those of foreign Armies; and secondly, that the nominal strength, weak as it is, is practically far more than their effective strength. I cannot help regretting that we have not, like other nations, remount dépôts, where our young horses can be trained and seasoned until they are fit to be placed in the ranks, and to take part in a campaign. Until this is done, the nominal strength of cavalry regiments is entirely a fictitious one. I venture also to think that it is neither fair to the horses themselves or to the men who ride them, to expect four-year-olds to gallop with 17 stone on their backs, or to do the work of aged horses.

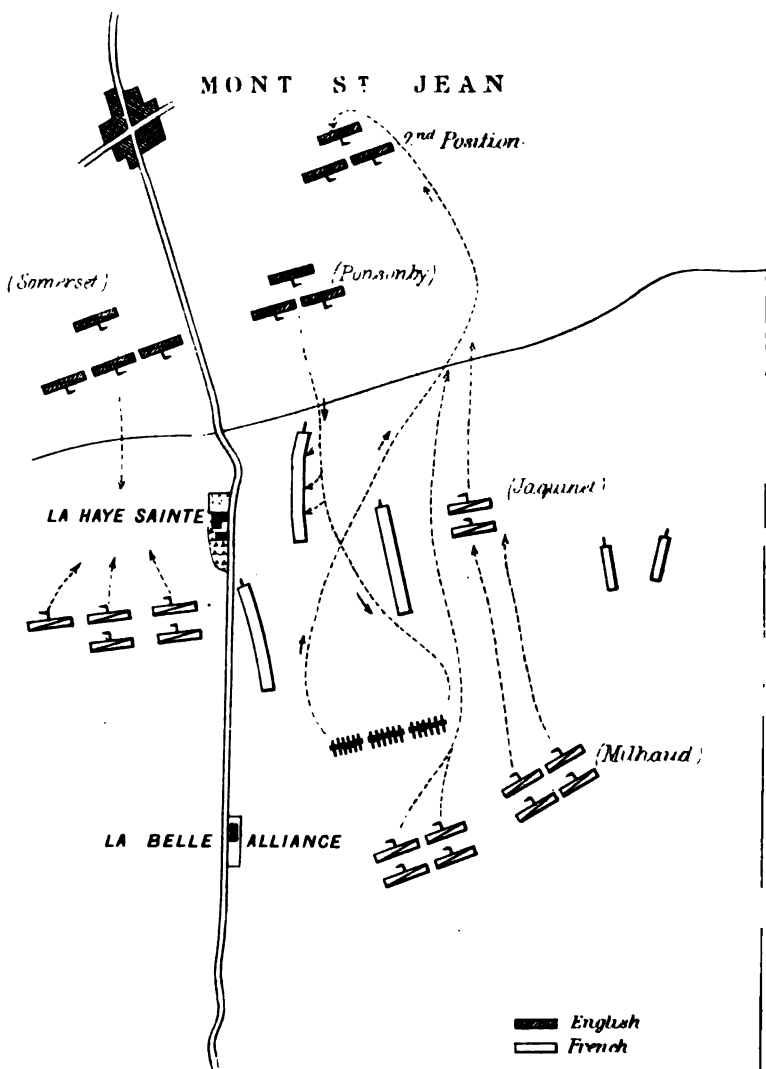
Before quitting the subject of the German cavalry, I would wish to mention their very excellent system of practising the *mêlée* or the disorder, which inevitably occurs in every regiment after almost every advance. Men, as it were, fall out, go through the motion of sword



CAVALRY ATTACK AT ZORNDORF 1758



CAVALRY ATTACK AT ZORNDORF 1758



CHARGE OF HEAVY CAVALRY AT WATERLOO

who were already engaged in front, from distinguishing their movements. The Russian cavalry had already been nearly destroyed, and those that remained did not await the attack of Seidlitz's squadrons. The infantry, however, who were formed twelve deep and supported by 100 guns, remained steady and received the charge which utterly annihilated them, and from that moment the battle was won.

There are many points deserving of special remark connected with this battle were there time to notice them, which I fear there is not. I must, however, point out the great freedom of action which on this occasion was left to the cavalry commander; in point of fact, in the latter part of the day, Frederick the Great conformed the movements of his army to those of his cavalry leader. Seidlitz's success was entirely owing to his extraordinary quickness of perception, and to the great care with which he had reconnoitred the ground between him and the enemy. Zorndorff was one of the most deadly battles that has ever been fought. Of 32,000 men, the Prussians lost about 12,000 killed and wounded; of about 60,000, the Russians about 21,000. Probably cavalry will never again play so important a part in any general action.

We now come to the battle of Waterloo, to illustrate, as I said before, the fatal consequences of neglecting the use of reserves. At a very critical period of the action, the Earl of Uxbridge, the Commander-in-Chief of the British Cavalry, with the true inspiration of a cavalry leader, perceived that an opportunity had arrived for striking a decisive blow, so he ordered Lord Edward Somerset on the right, to charge with the 1st and 2nd Life Guards and King's Dragoon Guards, keeping the Blues in reserve, while Ponsonby was to charge on the left with the Royals and Enniskillen Dragoons, having the Greys in reserve. He had previously told the Officers commanding the other cavalry brigades not to wait for orders, but to use their own discretion and to support any attack that might be made. The charge of both the heavy brigades was most marvellously successful. Somerset overthrew the cuirassiers opposed to him, while Ponsonby attacked a column of French infantry and annihilated it, then galloped on, attacked and captured forty guns. As Alison remarks, the achievement was unparalleled, two French columns 5,000 strong were completely destroyed, forty guns were rendered useless. But unhappily the light brigades had not supported, and the supporting regiments of the brigades themselves, carried away by their enthusiasm, had come into first line, when in the moment of victory, with their horses blown, they were attacked on the flank by French Lancers. The Union Brigade which had gone into action 1,100 strong was reduced to a single squadron, and the two brigades who had numbered 2,300 sabres could scarcely muster 200.

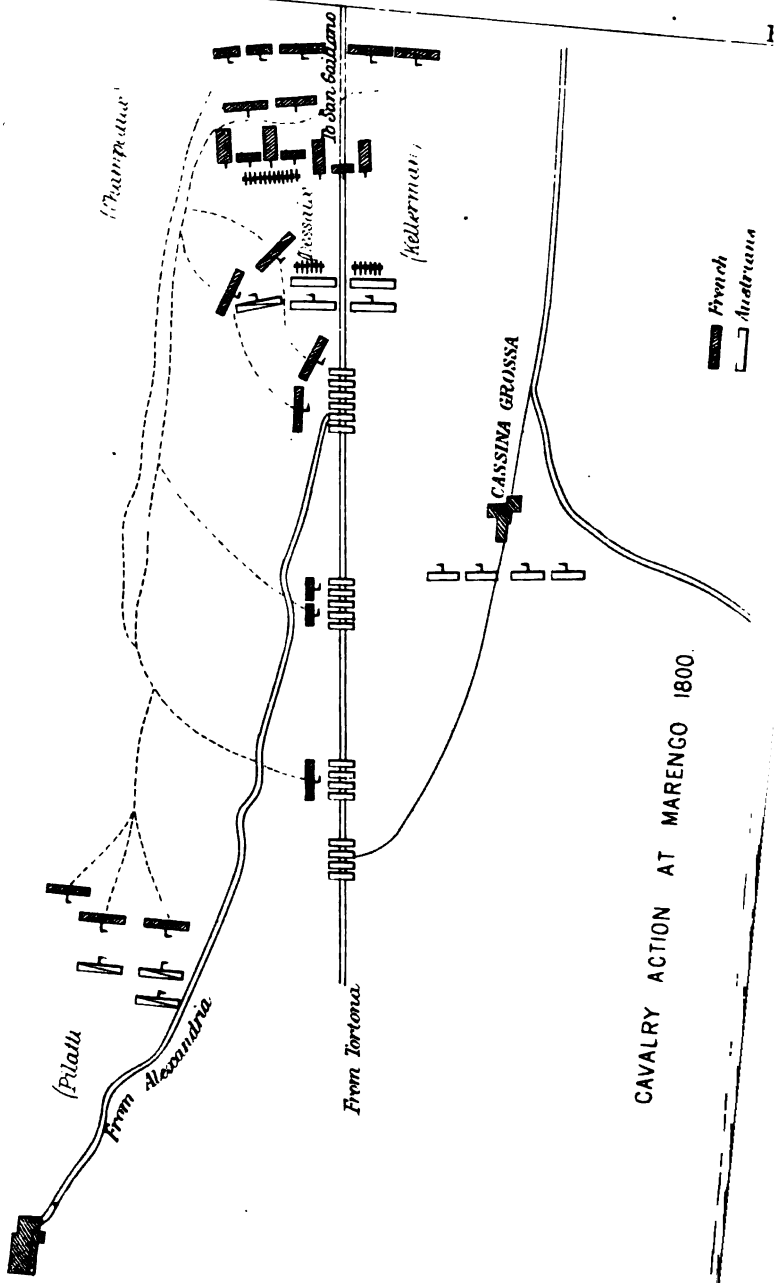
I have already spoken of the employment of cavalry when opposed to other cavalry, or when used on the flanks of an army; and I have endeavoured to shew that we cannot afford now, any more than in former days, to neglect the training of either Officers or men to act in large bodies. Cavalry manœuvres on an extended scale are now more than ever necessary. Great, however, as the mission of cavalry still

is, I think we must all acknowledge that it is no longer possible to use it in the manner of the first Napoleon.

Huge masses of cuirassiers can no longer hope to break through the centre of an army, or to have any success against unbroken or undemoralized infantry. It seems to me that the failure of the French cavalry leaders to recognise this axiom, was the cause of the disastrous mistakes they committed in the late war. I am, however, nevertheless, fully convinced that moments must come, and always will come in every great battle, when comparatively small bodies of horsemen may still be used decisively and effectually against both infantry and guns. The tendency of all troops armed with the breech-loader, and trained according to the newest methods of tactics, is to waste their ammunition, to scatter and to disperse. Almost inevitably, times must occur at the end of an action when bodies of infantry, fighting in loose order in the confusion and smoke of an action, wander away from supports, when ammunition is exhausted, when gaps occur in the line of battle, when guns find themselves unprotected, when in fact a charge of cavalry, if quick and decided, must produce a crushing effect. But as the opportunities for its action are now far fewer, as the consequences of a mistake are now far more disastrous than in former days, now more than ever does success depend on the ability of a leader.

I think I cannot do better than illustrate what I mean by the battle of Marengo, which is an admirable example of the manner in which the tide of victory may be turned by a small body of cavalry properly led. This action was fought on the 14th June, 1800, between about 28,000 French under Napoleon, then General Bonaparte, and about 30,000 Austrians under Mélas. Of these respective forces, the French had about 3,000 and the Austrians about 7,000 cavalry. I will not attempt to give an account of the battle, but suffice it to say that at about two o'clock in the afternoon, the Austrians had obtained so decided a success, while the French were in such complete and disordered retreat, that General Mélas with his staff thought the battle won and retired to Alexandria, the Quartermaster-General Zach being directed to carry out the pursuit. The French retreated in the direction of San Giuliano, and were pursued along that road by the Austrian infantry in column of route, while flanking parties were sent out on both sides, the main body of the Austrian cavalry being on the right. A last attempt, however, was made by Bonaparte to retrieve the fortunes of the day. He brought up Dessaix's infantry division, placed it across the road, and then directed Kellerman with a portion of his cavalry to pass from the left to the right flank between the two lines of infantry, and to attack the left of the Austrian columns as they were on the line of march. The manœuvre was perfectly successful. Kellerman first overthrew a regiment of dragoons that opposed him, then fell on and destroyed the Austrian's columns one after another as they were attempting to deploy. A complete route was thus suddenly converted into a victory, and on the following day the twelve principal fortresses were handed over to Bonaparte, and he became master of Italy. In fact, less than 700 horsemen changed the map of Europe.

MARENGO



CAVALRY ACTION AT MARENGO 1800.

French
Austrian

I think that it would be impossible to find a more striking example of the effect that may be produced by a timely charge of a very small body of cavalry on surprised and unprepared infantry. Timely, I may say it was, since Marmont, who witnessed it, declared that had it been delivered five minutes sooner or five minutes later it would have proved unavailing.

There are connected with the cavalry service one or two abstract questions to which, Sir, I should wish, if possible, to refer. A short time since the formation of a corps of mounted riflemen was strongly urged by some great and experienced military authorities. I may remark that the idea is not new, nor has the experiment been untried. So long ago as the Seven Years' War the Hungarians organized several corps of mounted infantry; as we all know, in the American Civil War, the so-called cavalry were as a rule little more than infantry on horseback, partly because the nature of the country was wholly unsuited for cavalry proper, and partly because there was neither the time nor the opportunity to give men that training which true cavalry soldiers require. Great, however, as the advantages undoubtedly are of being able to move riflemen rapidly from point to point, I cannot but think it would be most undesirable either to convert any portion of our small and insufficient body of cavalry into the hybrid animals described, or to create any new arm answering to that description. It would seem that every sixpence, which the country will consent to spend on our cavalry, should be devoted to increasing the strength of our skeleton regiments, to making them truly effective, and to creating reserves. I also see no reason whatever why cavalry soldiers proper should not be drilled and accustomed to perform all the manoeuvres of infantry, nor can I conceive why their power to manoeuvre on foot should in any way impair their efficiency on horseback. The cavalry of Seidlitz, which achieved so many and such great successes, was habitually and most carefully trained to act on foot; and in the late war, there are many instances when dismounted cavalry performed excellent service.

There is, however, one thing specially necessary if horsemen are to be thus employed, that is, that they should be armed with a weapon equal in every respect to that which they will meet. It is scarcely fair to ask cavalry armed with carbines that shoot indifferently at 500 yards to engage infantry armed with rifles that shoot well at 1,500. I may mention that the Prussian cavalry are armed with adapted Chasse-pôts and the Mauser cartridge. The arm is sighted up to 1,200 metres, and shoots admirably up to 800. I also venture to think that it is a subject worthy of consideration whether we should not follow the example of the Germans, and arm with rifles a certain proportion in every squadron of Lancers.

There is another point, also, to which I should wish to call attention. The invention of gunpowder and the improvement in fire-arms have caused a diminution in the depth of formations. Formerly infantry, and even cavalry, fought six deep. This formation was reduced to two deep, some nations, notoriously the Prussians, adhering until quite recently to their three deep formation. The British infantry were almost the first to fight two deep, being from their quality able

to maintain a shallower formation than other nations. Now practically the infantry of all European nations fight in single rank, with wide intervals. I am unable to understand why the same principle, in a modified form, has not been applied to cavalry. It appears to me that the only use of the rear rank is, first, to fill up gaps in the front rank, secondly, to tumble over the front rank, and, lastly, to receive the benefit of all the shot and shell intended for the front rank. Why, therefore, not reduce the strength of the rear rank to one-third or one-fourth, which would suffice to fill up gaps without entailing unnecessary loss? I have now before me letters from the late Duke of Wellington and from Sir Hussey Vivian, expressing opinions more or less favourable to the use of rank-entire. General Bacon, who commanded the cavalry of the English Legion in Spain, habitually practised it, and found it answer so well, that he was the principal advocate for its adoption. The arguments that have been used for and against this rank-entire are numerous and varied; but into these, I fear, there is now scarcely time to enter. I can only say that as the use of rank-entire is habitually practised in the Prussian and in other foreign armies, it would seem not unadvisable to practise it in ours, more especially as thereby division-drill might be tried without introducing a change in organization.

I would, lastly, wish to speak of cavalry pioneers. This subject has, I believe, already received attention, and I hear that the Committee appointed to report on it, have strongly recommended their adoption. I have lately seen a most interesting account of the organization of cavalry pioneers in the Austrian Army, and the arguments which may be used for their introduction into our service are, I think, most strong and convincing. The cavalry in advance of an army will at all times have to perform duties where pioneers or engineers are required. They will have to destroy and repair railroads, to blow up bridges, to erect and remove obstacles, to create drinking-places for the horses, and, in fact, to perform various works of that description too numerous to mention. I may notice that, in this particular, as well as in some others, the Austrian seems to be considerably in advance of the Prussian cavalry. In the latter service, there are no cavalry pioneers, but all the non-commissioned officers and older soldiers are practised in the destruction and repair of railroads. They also carry a dynamite cartridge, which destroys a rail in three minutes; each squadron also carries an apparatus for clinking up the telegraph posts and cutting the wires, also a silver thread for joining them. At the present time, it is the custom in our Army to attach mounted engineers to cavalry with a view to their carrying out these duties. It would seem, however, that the objections to this system are self-evident, and that it is desirable in every way to have the cavalry in advance of an army, dependent only on its own resources, in fact, able to move at the shortest notice wherever it may be required.

As my limits of time are already nearly exceeded, I must only venture to say a very few words in conclusion. I am far from being one of those who pretend to think the British Army is going to the dogs, or that it would fight a bit less brilliantly now than it always

has done; but I must say that there is one point on which I, in company, I am sure, with every other cavalry Officer, feel great disquietude. We regret to see the small force of cavalry we possess, but we regret still more the impossibility of replacing it, and not only of replacing it, but even of filling up the gaps which the first fortnight of a campaign would cause in the ranks. Half-drilled men, if their heart is in the right place, are valuable when incorporated with drilled and experienced soldiers of an infantry battalion. But in cavalry it is very different. So far from being useful, untrained men and horses are absolutely dangerous. They throw everything into disorder, and, like Von Hake's Hussars at Waterloo, are worse than useless.

Nevertheless, although more than five years have now passed away since the re-organization of the English Army was commenced, we have not yet seen any signs of cavalry reserves either of men or of horses. Our small force of cavalry once gone, disabled, or decimated, could not be replaced. Our armies might win brilliant victories, but their fruits could not be gathered. I am sure that all here present will join with me in expressing an earnest hope that the day may not be far distant when this omission may be repaired.

The CHAIRMAN: Gentlemen, I am sure that we are much indebted to the lecturer for calling our attention to this important subject. Of course, I am perfectly aware that in the opinion of the many cavalry Officers who are sitting around me, there is no subject that can require more consideration at this moment than that of the cavalry service. But circumstances have so changed that what might have been very well in former days, I do not think would be quite so suited to the present day. As regards mounted cavalry in our service, that of course is a matter of £ s. d.; but I am afraid it would require a good deal to induce the public to think it absolutely necessary largely to increase the Estimates in order to have a much larger body of cavalry. All I can say is, if it is thought necessary, I for one should be very glad to know that we had a larger body, but it must be perfectly understood that it is a very expensive element, and will largely increase the War Estimates. Then as to the difficulty about horses: no one objects so much as I do, to see young horses too early backed, but as a matter of expenditure, if you have large depôts, you must pay for them, and as we have very small establishments, it is essential that every available horse should be in the ranks. There can be no two opinions that it is a better thing to back a horse, and get out of him what you can, than to keep him idle, and add to the expenses during the time he is so kept. That is the great difficulty we have to contend with. As regards the question of three lines, I cannot suppose that there can be two opinions upon that subject. All cavalry, like every other form of arm, must be well supported. The great fault has been of late years that we have extended our lines a great deal more than has been prudent. It is the natural impulse to extend, wherever there is a great latitude for action; but I think there can be no doubt that unless it be an extended line, well supported by reserves, either of infantry or of cavalry, but particularly of cavalry, it is a very unfavourable formation. I remember well frequently talking this question over with my late gallant friend, Sir Hope Grant, and Sir Hope Grant said to me over and over again that even a squadron of cavalry ought always to be divided, and to have a support; no portion of a squadron should be sent to the front without a support. If you adopt that principle, you extend it according to the numbers you have in command. There is a peculiarity about the Prussian system, which no doubt is also very valuable. I do not think it was alluded to to-day. I believe that in all these three-line formations care is always taken that the second line is thrown forward, or that whatever flank it is on, it always throws that flank forward, so that you make the flank-movement immediately upon the front attack; and that, of course, is a very important thing, because if the

front attack has taken effect, a certain amount of disorganization results, and a flank movement on a disorganized body is, of course, of the greatest possible importance. And that, I believe, is one of the new features, and one of the most important features of the present system in the Prussian service.

As regards the question of cavalry never manœuvring together in large bodies, I think that is doubtful. I apprehend that there are many occasions when you must sacrifice troops for the good of the whole, and on those occasions I have no doubt the cavalry must take its share of being sacrificed as well as any other branch of the service; but beyond that, I do not think any large body of cavalry would ever be sent to the front against the fire-arms of the present day, because they are so destructive that really at the end of any distance it is impossible to assume that many men or horses would be in a condition fairly and strongly to carry out a direct charge. But, that being so, I do not think it at all militates against the necessity for cavalry; on the contrary, I think it is one of the greatest mistakes—though I am happy to say it is now becoming exploded—to say that the day of cavalry has gone by. I think the day of cavalry has not at all gone by; on the contrary, an army without cavalry would do nothing at all now. Everything must be done so quickly,—advances, flank movements, and every other movement are made so quickly that unless you have large bodies of cavalry well to the front, at considerable distances, and almost unsupported by infantry, you do not know what is going on; the great object, therefore, nowadays must be to pay the greatest personal attention to reconnoitring and outpost duty. On those points I think we, perhaps, have been hitherto rather backward, but it is very natural. It is impossible to study a subject of that sort unless you have the opportunity of doing so at manœuvres. The difficulty that we have to contend with in manœuvres in this country is something very great. There is no doubt that of late we have had greater facilities than we had formerly; at the same time we have our country so intersected, and there is so much real damage done (unless the greatest care is taken) that we cannot expect to be able to go over private property without great objections being raised. I must say that the greatest liberality has been shown us upon the various occasions on which we have had manœuvres, but still there is always a great indisposition to make use of private property, and that makes all our movements extremely difficult. We must, therefore, imagine a great deal, and theorise a great deal more than is good on these occasions, because, depend upon it, theory is all very well, but practice is a great deal better. To show the value of cavalry on these occasions, I need only point out that it is not only the superior Officers who ought to show great ability, but the youngest Officer may be sent to the front with a few men, and any information he may gain, or any intelligence he may show, may save a whole army, or may be the means of gaining a great victory. Therefore it depends upon the individual Officer, from the highest to the lowest; and I really believe whilst every Officer should be well instructed, no portion of the service should have a quicker apprehension and appreciation of country than the cavalry officer. I believe, so far from looking down in any way on the cavalry, the cavalry soldier—and Officer especially—should have the greatest possible military acquirements. Amongst other things, sketching is of the greatest importance. I do not believe that any of our Officers ever dreamt of such a thing formerly, not because they would not have done it if called upon, but because they were not called upon. Now we have changed all that, and great attention is paid to the subject of sketching, and I am satisfied that the more those subjects are attended to, the better will be the position of our cavalry. I have ventured to throw out these few observations on this occasion because I do not like to leave this Institution without showing that I have taken some interest in the invaluable remarks made here on the part of the lecturer, and in the subject with which we had to deal. On this occasion we have to thank him for having brought the subject so prominently and ably before us. I understand it is wished that there should be some discussion about it. You will perceive in my position it would be better I should retire and leave the discussion free and unbiassed by not being present, and I therefore hope my leaving you now will not be considered as at all an indication that I do not take the greatest interest in hearing what may be said; but I think, under the circumstances, it would be more acceptable to you that you should have perfect freedom of discussion. Under these circumstances I believe General Shute will take the chair.

His Royal Highness having retired, General Shute, C.B., M.P., took the chair.

No Officer rising to commence the discussion, General Shute said: I am sorry that no Officer seems inclined to rise to make any observations on the lecture we have just heard. Perhaps if I venture to make a few remarks myself it may start a discussion on this important subject. First, then, with reference to the proposed re-mount depôts, I confess, from a considerable experience in India, and from what I have seen of the cavalry of other nations, as well as our own, I am inclined to think the practice of Commanding Officers buying the young horses for their regiments, as they do in England, and being responsible not only for their purchase but for their after improvement, has very great merits. I am sure the gallant lecturer will agree with me that there is no cavalry so mounted as the English, except perhaps cavalry of the Russian guard, which consists only of about ten thousand, which, as compared with their army, is small; and with regard to the instruction of the cavalry soldier, I am no great advocate for mounted rifles, because I am perfectly certain that cavalry soldiers should be so thoroughly instructed in dismounted service and the use of their rifles as to render such a force unnecessary. With reference to a cavalry reserve, I myself suggested last year to the Secretary of State for War—partly with a view to a slight increase of the cavalry, but still more in order that cavalry regiments might be less inconvenienced and delayed when a complete corps, squadron, or troop is suddenly ordered out in aid of the civil power, or any other emergency, by having to make arrangements for mounting old soldiers employed to break young horses, or formed troopers, handing over four-year-olds to the temporary care of recruits, making arrangements for drill sergeants, drill corporals, rough-riders, &c., to be left in the barracks—that there should be in every regiment a ninth troop, to be what the French would call an “out of the rank troop,” containing all drill and riding instructors, young horses, with a proportion of *competent* though old or married soldiers who have nearly completed their services, to break them, and a proportion of old horses considered fit for little more than riding-school work for drilling recruits. The band and tradesmen should also be attached to this troop.

From this reserve troop, as I should call it, young soldiers and young horses would be drafted into the service squadrons as they were fit for regimental field days or general duty.

But some cavalry subalterns said: “Well, but General, but supposing I were promoted to a captaincy, do you think I should like to have this troop?” Of course not, but what I proposed was this: that it should be specially kept under a business man, say, receiving 2s. 6d. a-day extra, and that the subaltern in the same way should be paid extra. And I think it would be an admirable opportunity in these days, when purchase is gone and there is nothing for a man to look to who is promoted from the ranks, that he should have an opportunity of having the command of that troop, and bringing it on, understanding that he was rarely to leave barracks or go on leave. My idea was, that having that troop, it would form a depôt on all occasions. On this system your four squadrons could be ready, whether to go to a European war, to march to a manœuvre, or to aid the civil power, without any hindrance. That would be done with little expense, I hold with economy to the country, and would in some way fall in with the lecturer’s idea of a depôt, because I maintain that our cavalry should always be prepared for war. What do we do now? We send three squadrons into the field instead of four, which is the proper organization, and form one squadron into a depôt, whereas a troop answers every purpose. And I maintain that for war, three squadrons is a false organization, because a cavalry regiment should be divisible, and a wing (two squadrons) under a field officer should be as effective as a weak regiment. As regards mounted rifles, the difficulty is this: I am perfectly certain that all who have had experience in the Crimea know, that the greatest essential is a knowledge of, and care of horses. The mounted soldier should feel that his primary arm and first care must be his horse. You cannot, therefore, give the horses too much care, and mounted infantry would not feel this; and I think if you had what you call mounted rifles, they would rather consider their horses of secondary consequence, and the result would be that after a few weeks of a campaign they would be dismounted. The cavalry soldier ought to have a good rifle. Length of barrel is not necessary to length of range, and there is no reason on earth why the cavalry soldier should not have a rifle ranging up to 1,000 yards, and I

think many infantry Officers present will agree with me; you do not often want more than that. I was on the Yeomanry Committee last year, and we strongly recommended that the Yeomanry should be practised in dismounted service. We know there is no sort of difficulty in training men to dismounted service. With regard to the Lancers, I am very prone to think that with our very weak proportion of cavalry, our Lancer regiments would be more valuable with rifles than with lances.

With regard to telegraphs, I have suggested long ago that every cavalry non-commissioned Officer should be taught to use the electric telegraph. There was, of course, a difficulty when the telegraphs were not in the hands of the Government, but now you may in every out-post and out-quarter, where the cavalry soldier has less to do than at head-quarters, get permission to have some of your non-commissioned Officers taught. So with regard to the destruction of railways, though I should hardly go in for the destruction of stone bridges, still they should be able to destroy the line and render roads and fords impassable, though I do not say they should go so far as to be instructed to make bridges for the passage of other troops following them, as some have suggested, because cavalry have other duties to perform that will not admit of such delays.

With regard to attack by cavalry, I am perfectly certain that we all admit that it is an arm of opportunity, and that the greater the extension of the troops, the more frequently will opportunities be found by a dashing good cavalry officer. In fact, I think we have opportunities now in warfare which cavalry never had before.

In the Prussian system, as the lecturer says, no opportunity is lost by cavalry of flank attack. No front attack should ever be made without an oblique attack on the enemy's flank if possible. Even the first line should have a squadron in rear of each of its flanks to protect its flank from a similar rear attack, and to dash forward and take the enemy in flank. I am only sorry I have not been able to take notes of the very valuable remarks of the gallant lecturer, every one of which I should most heartily endorse. I only hope I may yet have an opportunity in the House of Commons of pressing an augmentation of the cavalry. My own idea would be to have double the number of men in every cavalry regiment that there are horses. You may buy horses in case of sudden war, but you cannot buy ready-made dragoons. There are horses enough in every regiment to instruct double the number of men, and an inspecting General should see one-half mounted on one field-day and the other half on the next. I do not think this would necessarily entail any great expense.

Major RUSSELL: It appears to me that the great argument in favour of having re-mount depôts for young horses is the fact that thereby the nominal strength of our cavalry regiments would nearly coincide with their effective strength. At the present time, cavalry regiments at home, on what is called the foreign establishment, have a nominal strength of 606 men and 384 troop horses, and yet I discovered yesterday at Aldershot that the greatest strength on record ever turned out by any regiment was 318 troop horses, and this on the occasion of the review before the Emperor of Russia, when many horses were placed in the ranks that were unfit to take the field. The average strength of a strong regiment is from 290 to 300, and weak regiments, which have a nominal strength of 302 troop horses, rarely can turn out more than 230, if so many. As a point of fact we have now in England a very much smaller force of cavalry than appears on paper, as every regiment has 60 or 70 young horses that are quite unfit to undergo the fatigues of a week's campaign. In Germany no young horses appear on the establishment of a regiment until they are fit to take the field.

General SHUTE: I am really extremely sorry that we have not had the advantage of further observations, but the real fact is, all that has been discussed by the able lecturer is so utterly impossible of contradiction that there is no room for discussion. I now beg on your behalf to present our cordial thanks to Major Russell for his most instructive and interesting lecture.

Evening Meeting.

Monday, March 20th, 1876.

COLONEL LORD EUSTACE B. H. GASCOYNE-CECIL, M.P.,
Surveyor-General of the Ordnance, in the Chair.

NAMES OF MEMBERS who joined the Institution between the 31st January
and 20th March, 1876.

LIFE.

Montgomery, R. A., Lieut. R.A.
Fincham, Herbert G., Assist. Commissary.
Wilson, J., Colonel Madras Staff Corps.
Daniell, W. H. M., Lieut. R.N.
Godfrey, Henry J., Lieut. R.N.
Woolf, Richard, F.S.A., F.R.S.L., Lieut. late Worcestershire R.V.
Oxley, Charles L., Commander R.N.
Renaie, Geo. B., late Midshipman R.N.
McNeill, J. C., W.C., C.B., C.M.G., Colonel h.p. 47th Regt.

ANNUAL.

Brackenbury, H., Major late Depot Batt.	Broome, C. S., Lieut. R.N.
Burroughs, C. de P., Lieut. 82nd Regt.	Butler, J. B., Captain R.N.
Arbuthnot, George, Lieut. 2nd R.N.B.	Maunder, F. N., Lieut. R.E.
Dragoons.	Onslow, Geo. M., Captain 20th Hussars.
Hanniker-Major, Hon. A. H., Lieut.	Radcliffe, R. P., Colonel R.A.
Colds. Guards.	Sparks, E. T. B., Lieut. 98th Regiment.
Golding, Henry, Captain h.p. 69th Regt.	Wise, Augt., Captain 2nd Warwick Mil.
Torrens, J. A. W. O. N., Lieut. 2nd	Scott-Douglas, J. H., Lieut. 21st Rl.
R.N.B. Dragoons.	N.B. Fusiliers.
Foster, Kingsley O., Capt. The King's	Young, S. S., Major 39th Middx. Rifle
Own 1st Stafford Mil.	Volunteers.
Biddlecombe, Sir George, Kt., C.B.,	Newall, D. J. F., Colonel R.A.
Captain R.N.	Bartholomew, Robt., Lieut. Wigton Mil.
Willan, L. P., Commander R.N.	Plunkett, R. H. W., Lieut. R.H.A.
Courtney, D. C., Lieut. R.E.	Smith, Edward, Capt. 40th Middx.
Twemlow, Fran. R., Lieut. 3rd Stafford	Rifle Volunteers.
Mil.	Newington, Cecil G. H., Lieut. 31st
Pardoe, T. F., Captain 22nd Regiment.	Regiment.
Norcock, W. J., Lieut. R.N.	Thompson, J. C., Capt. 26th Middx.
Crozier, H. E., Captain R.N.	Rifle Volunteers.
Hamilton, I. J., Capt. 8th King's Regt.	Gibbs, J. R., Lieut. 6th Regiment.

SOME SPECIAL FEATURES IN LARGE AND SMALL GRAIN POWDERS.

By Major J. P. MORGAN, R.A., Assistant-Superintendent Royal Gun-
powder Factory, Waltham Abbey.

THIS is now the seventh time that I have had the honour of reading
a paper in the theatre of this Institution; but I have never before
received such distinguished encouragement as on this occasion. I trust
my perseverance will induce some others to bring forward the results
of their special studies for the general benefit of the Services. It is

also the third time that I have read a paper on the subject of gunpowder. The first was on the determination of its explosive force, without an accurate knowledge of which no scientific progress can be made in its manufacture. The second showed the difficulties which had been encountered, and the success which had been achieved in the manufacture of pebble powder. In the present paper, assuming the conditions on which the thorough ignition of a charge mainly depends, I intend to show how great an approximation there is to these conditions in the special features which regulate the burning of the individual grains of powder themselves, and how this depends not only on the size of the grains, but also on the facility with which the flame can penetrate towards the centre of the grain, and on the rate of burning of the particles of charcoal of which it is partly composed.

It is not many years since two sorts of powder only were sufficient for nearly every requirement of the Service, viz., Large Grain or L.G., for guns, and Fine Grain or F.G., for small arms. Both of these powders were manufactured in the same manner from the same description of charcoal, viz., alder or willow, differing from each other only in the sizes of the grain, L.G. being sifted between meshes of 8 and 16 to the inch, and F.G. between those of 16 and 36.

On the introduction of rifled small arms, F.G. was found unsuitable, and the first and most important alteration was the substitution of dogwood for alder, or willow charcoal. This necessitated the entire separation of the manufacture of small arm powder from that of powder for guns. The first powder of this description was made in 1859, and was of a size 16- to 24-mesh. It was known as Enfield Rifle, or E.R. powder. In 1860, the size of grain was increased to a 12- to 20-mesh, and the powder was called J. 2 until 1865, when the name was changed to Rifle Fine Grain or R.F.G. These dogwood powders can be distinguished from the old F.G., not only by the size of the grain, but more readily by the charcoal being browner and the grain being rounder and not so flakey. The inner portion of dogwood is of a reddish brown colour, and this colour is imparted to the charcoal and thus to the powder. The roundness of the grain is due to the soft friable nature of the charcoal, dogwood being a small soft wood and easily charred.

It has always been found that powders made from dogwood are more violent than those made from alder or willow. Some have thought that this is due to the larger proportion of gaseous matter in the constitution of dogwood charcoal, as exemplified in the following analyses, taken from the late Captain Smith's "Handbook of the Manufacture and Proof of Gunpowder."

	Ash.	Carbon.	Hydrogen.	Oxygen and trace of nitrogen.
Alder	1·24	87·0	2·97	8·78
Willow	2·02	85·82	2·88	9·28
Dogwood.....	1·71	83·80	3·28	11·21

Dr. Percy, however, justly observes, I think, with regard to the presence of gaseous matter in charcoal as fuel, that, inasmuch as there is always an excess of hydrogen, over what is required to burn up all the oxygen, the latter must be regarded not only as water, but as water in the solid state or most disadvantageous condition, and its presence is therefore detrimental.

Dogwood being, as I have said, very readily charred, the process of charring is usually conducted at a low temperature; and wood charred at a low temperature always contains more oxygen and hydrogen in its constitution than more highly burnt charcoal. But it by no means follows that the greater violence of explosion of the powder is due to the greater amount of gas in the charcoal. No doubt the gas in the charcoal aids the inflammability; but I think that the main reason is to be found in the fact that charcoal "burnt" at a high temperature is always harder, denser, and a better conductor of heat than when burnt at a low temperature. The conductivity of heat makes it withstand the action of the heated gases, I imagine, just in the same way as the well-known conductivity of heat in copper makes it the best material for resisting the action of fired gunpowder in the bore of a gun; and its hardness prevents it from being reduced to an impalpable dust so readily as slack-burnt or under-burnt charcoal. If the latter be crushed between the fingers it is easily reduced to a fine soft dust, while the former is hard and gritty. It is therefore, I think, because the particles of charcoal are smaller and more readily inflammable that dogwood powders, more especially when the charcoal has been burnt at a low temperature, are quicker than other powders. What appears to be required, therefore, in the manufacture of fine grain powders, is that the particles shall be as fine and as close together as possible, so that the combustion may proceed with sufficient rapidity.

The question, however, may be asked, cannot the slower burning of the alder or willow charcoal be compensated for by making the grains of powder finer? I shall answer this question by a short statement of the experience of Waltham Abbey on the point. I have already referred to the change from F.G. to E.R. powder, in which dogwood was introduced, and to the change from E.R. to J. 2 or R.F.G., in which the size of grain was increased; and I may add that in the most recent manufacture of this powder, the grain is somewhat larger than in the original manufacture, while in addition the density has been increased, a quality which has the same effects to a great extent as size of grain. And now, as far as we know, no powder excels R.F.G. in shooting qualities in the Enfield rifle.

When the Martini-Henry rifle was introduced, it was found that R.F.G. could not be used, because it fouled the rifle. What was the cause of the fouling it is difficult to say, unless it be that the density of the powder was too low and its action too quick, which would also account for the inferior shooting, if we suppose that the great pressure would crush up the bullet and thus interfere with its concentricity of spin and accuracy of flight. It is to be borne in mind that the bore of the M.H. rifle is small and the bullet long, which not only very

much increases its inertia, but also gives less space for the powder to expand. Hardening the bullet has better enabled it to resist the greater strain which is thus produced, but the action I have described is occasionally to be observed in the drop shots which sometimes occur with this rifle, which probably are the result of the bullets being exceptionally soft. The fouling might, therefore, be due to the great length of the cartridge interfering with its thorough ignition with so quick a powder, in the same way as wave action exists in guns, when the powder is not suitable. I can see no reason why this action should not take place with small arms as well as with large guns, and so part of the charge remain unconsumed: and this, I think, is no doubt one cause of fouling, though it is not the only one. The want of proper lubrication by the non-expansion of the beeswax wad, and consequent escape of gas over the base of the bullet is another. Exceeding dryness of the air and want of softening of some of the products of combustion from deficiency of moisture is a third.

In support of the notion that wave action is a cause of fouling, I may mention that a sportsman lately told me, that when he washed out the piece after firing a very fine powder, the water became as black as ink, but that this did not occur when a coarser powder was used.

Shortening the charge by chambering has simplified the problem of finding a suitable powder, but still it has been found that it is only by increasing the charge from 70 to 85 grains, and using a very slow burning powder, that satisfactory results are to be obtained.

The Committee on Breech-loading Small Arms, in their investigations as to the most suitable powder for the M.H. rifle, found that Curtis and Harvey's No. 6 powder gave the best results. They naturally wished to obtain a similar powder from the Royal Gunpowder Factory.

In the opinion of the Superintendent at Waltham Abbey, such a powder could be produced by making the following alterations in the manufacture of R.F.G.:—

- 1st. Charcoal burnt at a lower temperature;
- 2nd. The charge taken off the mill-bed in a moister condition;
- 3rd. Pressed to a higher density;
- 4th. More highly glazed and sifted to a more uniform size of grain.

A sample was sent from Waltham Abbey to the Committee, January 6, 1869, designated W.A. special No. 6, and also another R.F.G. No. 6, to compare with Curtis and Harvey's No. 6. These powders were all of the same size of grain, viz., 14- to 17-mesh. I give the dates as it is important to bear in mind the season of the year.

The Committee reported, February 6, 1869, that on the whole Curtis and Harvey's No. 6 shot best, but suggested improvements might be made in the manufacture of the W.A. powder.

March 20, 1869.—Another sample of W. A. Special No. 6 was sent; and, April 2, 1869, the Committee reported that the results were so satisfactory—15 targets giving a mean figure of merit at 500 yards of 1.08 feet compared with Curtis and Harvey's No. 6, 1.12 feet—as, in

their opinion, to warrant a more extended series of experiments. What the densities and velocities of these powders were I am unable to trace.

Soon afterwards, April 19, 1869, some further specimens were forwarded, with a view to get a higher velocity.

The following table gives a description of these powders, with the results obtained by the Committee:—

No.	Mesh.	Velocity.		Percentage of moisture absorbed.		Density.	Figure of merit, 500 yards, feet.
		Muzzle	Mean diff.	In 24 hours.	In 96 hours.		
		f. s.	f. s.				
3.....	14 to 17	1,316	10.0	1.6	5.0	1.63	.77
	17 to 20	1,329	6.7				.98
	14 to 20	1,320	8.5				.83
4.....	14 to 17	1,326	10.3	1.8	5.5	1.60	.78
	17 to 20	1,331	14.1				1.11
	14 to 20	1,335	5.8				.80
5.....	14 to 17	1,287	7.6	2.0	5.9	1.67	.99
	17 to 20	1,293	8.8				.95
	14 to 20	1,287	9.6				.83
C. & H. No. 6 ..	14 to 17	1,294	10.8	1.8	5.6	1.71	
R.F.G.....	12 to 20	..	..	..	..	1.55	

April 30, 1869.—The Committee reported that the three samples of powder, Nos. 3, 4, and 5, gave very good and nearly equal results, superior to those obtained with the Curtis and Harvey's No. 6; that there was no fouling with any of the powders, and that 14- to 20-mesh seemed to give the most uniform results.

The differences in manufacture of each kind were as follows:—

No. 3.—Charcoal not so much burnt as for R.F.G.; worked as R.F.G.; pressed $13\frac{1}{2}$ inches; glazed 12 hours.

No. 4.—Charcoal same as for R.F.G.; worked with rather more moisture than R.F.G.; pressed 11 inches; glazed $5\frac{1}{2}$ hours.

No. 5.—Charcoal same as for R.F.G.; worked with rather more moisture than No. 4; pressed $10\frac{1}{4}$ inches; glazed $5\frac{1}{2}$ hours.

R.F.G.—Pressed $10\frac{1}{4}$ inches and glazed $5\frac{1}{2}$ hours.

Seeing that No. 4, 14 to 20, gave a good range of grain, and therefore was economical to manufacture, and also gave a high velocity and good shooting, Colonel Younghusband, then Superintendent at Waltham Abbey, gave it the preference.

124 barrels of this powder were made accordingly, and named Rifle Martini-Henry, or R.M.H. powder.

December 7, 1869.—Captain Majondie, Assistant-Superintendent Royal Laboratory, thought this powder fouled the long chamber rifle. Colonel Dixon, January 5, 1870, also was of opinion that this powder was not suitable for either the long or short chambered rifles. And General Lefroy summed up the facts briefly thus: that, at a tem-

perature below or near the freezing point, the small-bore cartridges fouled the rifle, whether made up with Curtis and Harvey's or W.A. powders, and whether fired with long or short chamber rifles; and that, at moderately low temperatures, even up to 50 degrees, they fouled with W.A. powder, but not with Curtis and Harvey's, even in long chambers.

A Sub-Committee, under Lient.-Colonel Fletcher, was appointed to investigate this matter, and the question of powder was again reopened.

It will be observed that the density of R.M.H. powder was low, the same as that for R.F.G. as now manufactured. In the next samples forwarded, this defect seems to have been guarded against.

The following powders were sent for trial :—

Date of sending.	Density.	Size of grain.	Distinguishing mark.
January 18, 1870	1·67	14 to 20	A
" "	"	12 to 16	B
" 25, 1870	1·76	14 to 20	C
" "	"	12 to 20	D
" "	1·74	14 to 20	E
" "	"	12 to 20	F
February 3, 1870	1·718	14 to 20	G
" "	"	12 to 20	H

February 14, 1870.—Colonel Fletcher's Committee reported that B and G powders were most suitable, and gave the best results. The velocities of these two powders taken in the Martini-Henry rifle at W. A. were B, 1,296 f.s.; G, 1,301 f.s.

There appears something very definite in these results, the combination of density and size of grain producing almost identical velocities corresponding with that of Curtis and Harvey's No. 6.

Two more powders were forwarded, viz. :—

Date of sending.	Density.	Size of grain.	Distinguishing mark.
February 24, 1870	1·68	20 to 28	K
March 1, 1870	"	14 to 20	$\frac{K}{S}$

The former was intended to obtain a higher velocity in the Martini-Henry rifle, and the latter was for the Snider with an increased charge, and was the large grains obtained in the manufacture of K powder.

March 14, 1870.—The Committee decided to recommend K for the Martini-Henry, and $\frac{K}{S}$ for the Snider.

March 19, 1870.—Specifications were made out, and $\frac{K}{S}$ was called L, for the convenience of Store ledgers.

The specifications were as follows :—

Both powders to be manufactured as R.F.G. Density 1·67 to 1·69; but K to have a size of grain of 20- to 28-mesh, and to give a velocity with 85 grains in the Martini-Henry rifle of 1,330 to 1,370 feet; and L to have a size of grain of 14- to 28-mesh, and with 70 grains to give a velocity of 1,145 to 1,185 feet in the Snider rifle.

April 23, 1870.—K was ordered to be manufactured.

July 4th, 1870.—The Superintendent Royal Laboratory and the Superintendent Royal Small Arms Factory stated, that the shooting in the short action Martini-Henry rifle was indifferent, and they strongly recommended Curtis and Harvey's No. 6 to be used in the Wimbledon competition for that year.

Colonel Fletcher's Committee naturally imagined that this result was due to the manufacture at W. A. not having been kept up to the standard they recommended. But, on comparing a sample with that originally manufactured, the following results were obtained, 12th July:—

	Muzzle velocity.	Mean difference of velocity.	Density.
	f. s.	f. s.	
K	1,374	4·6	1·685
K Supplied to the Committee February 23	1,358	7·9	1·681

which showed no greater difference than might be accounted for by the ages of the powders.

It was also fired against Curtis and Harvey's No. 6 :—

Powder.	Date of firing.	Muzzle velocity.	Mean difference of velocity.
		f. s.	
K	July 21.	1,386	8 3
Curtis and Harvey's .....	.. ..	1,379	10·3
K	July 23.	1,392	5·0
Curtis and Harvey's .....	.. ..	1,389	4·4

which shows a remarkable amount of uniformity in the two powders as regards velocity. The high velocities in both cases were due to the extreme heat of the weather.

Colonel Dixon, the Superintendent Royal Small Arms Factory, still further reported, July 7, 1870, against the shooting of this powder in the Martini-Henry rifle, and suggested that it was due to the powder being too quick, his experience going to prove that a quick powder will not give accurate shooting.

This appears to be the true explanation; and no doubt the inferior shooting was caused by the combined action of small grain and the heat of the weather. What suited the rifle in February was too quick in July.

An attempt was made to remedy this defect by increasing the density; and samples of K₁ and L₁ were made August 8, 1870, of a density 1·718. It was found, however, in the Royal Laboratory, that this diminished the velocity very considerably in the Snider rifle, giving only 1,187 feet, against that of L, 1,232 feet; while R.F.G. gives 1,260 feet. And, though the charge was increased to 75 grains, the shooting was affected by fouling, as follows:—

Rounds.	Figure of merit.	Remarks.
	inches.	
1 to 20	13·15	
21 to 40	19·20	
41 to 61	22·25	
61 to 80	26·8	Fouling.

The Committee also reported, October 17, 1870, to January 26, 1871, on the shooting of K in the Martini-Henry rifle, showing a figure of merit of 14 inches against 10·8 with Curtis and Harvey's No. 6.

It was a favourite idea, with many, that the excellence of Curtis and Harvey's No. 6 depended on the uniformity of the size of its grain, and some L₁ powder was sifted between 14- and 17-mesh, and called L'. The result obtained by the Committee, March 2, 1871, was favourable, the targets being:—

L'.	Curtis and Harvey, No. 6.
Inches.	Inches.
13·1	13·3
11·8	13·8

Fresh samples of this powder were made, March 6, 1871, and April 16, 1871, the former of a density of 1·639, and the latter 1,747, which was called M.

The Committee reported, June, 5, 1871, that the results were satisfactory, the targets being:—

Curtis and Harvey, No. 6.	M.
Inches.	Inches.
12·4	12·7

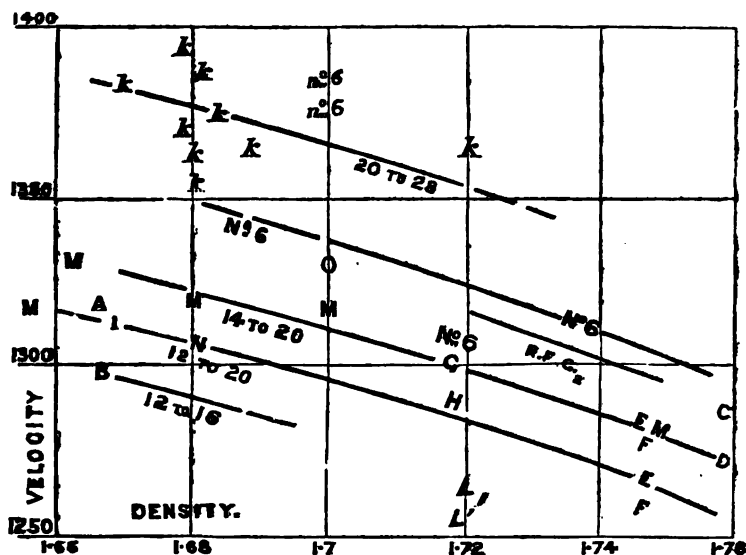
Further trial, however, proved M to be inferior to No. 6.

The following diagram was made out by myself to see whether any general principles could be obtained from previous experience to serve as a guide as to how the best results could be obtained.

I have drawn lines of velocities of the various sizes of grain, and it will be observed that Curtis and Harvey's No. 6 ranks very high in proportion to its size of grain and density, and shows that there must be something in its manufacture which produces this result.

The following particulars will help to explain the natures of the powders which are designated by letters in the diagram. The dates of manufacture and of firing are given, as it is necessary to allow for the age of the powder and the season of the year.

FIG. 1.



Mark	Date of manufacture.	Density.	Size of grain.	Date of firing.
A	January, 1870	1.667	14 to 20	January, 1870.
B	" "	1.667	12 to 16	" "
C	" "	1.764	14 to 20	" "
D	" "	1.764	12 to 20	" "
E	" "	1.747	14 to 20	" "
F	" "	1.747	12 to 20	" "
G	February, 1870	1.718	14 to 20	February, "
H	" "	1.718	12 to 20	" "
I	" "	1.667	12 to 20	" "
J	" "	1.667	Pass 20	" "
K	" "	1.681	20 to 28	" "
L	" "	1.681	14 to 20	" "
K ₁	August, 1870	1.718	20 to 28	August, "
L ₁	" "	1.718	14 to 20	February, 1871.
L ₁	" "	1.718	14 to 17	May, "
M	April 21, 1871	1.747	14 to 17	" "
K	June, July, and August, 1870.	1.67	20 to 28	June, July, and August, 1871.
M	July and August, 1871 {	1.69	14 to 17	May and August, 1871.
N		1.66	12 to 28	
O		1.7	14 to 28	

What appeared to be required was a velocity of about 1,300 to 1,320 feet. This could not be obtained with the same size of grain and density as Curtis and Harvey's No. 6; but it was anticipated that

by giving a little less density, while maintaining the same size of grain, equally good results would be obtained. Three samples of powder were accordingly made of densities 1.66, 1.68, and 1.7, and they were sifted between 14- and 17-mesh, called M, as before. At the same time two other samples were prepared by sifting some of the powder, 12 to 28, called N, and 14 to 28, called O, so as to get powders a little quicker and a little slower, while giving a greater range of grain.

These samples were forwarded for trial, but the results were not quite so good as Curtis and Harvey's No. 6; and, as the Committee had recommended that no powder which gave results inferior in shooting to Curtis and Harvey's No. 6 should be accepted, the idea of matching Curtis and Harvey's No. 6 by powder made according to W.A. manufacture was abandoned.

I may here notice more particularly the differences between the manufacture of Curtis and Harvey's No. 6, and W.A. R.F.G., to which I have already referred.

(1.) With Curtis and Harvey's No. 6 the charcoal is burned for a much longer time at a lower temperature. This improves the rapidity of burning of the powder, as has already been stated, but at the same time it renders it more hygroscopic, and it is a matter for serious consideration whether a powder, if made on this principle, would retain its keeping qualities if stored for many years. It has always been considered at W.A. a matter of first importance that the charcoal should be thoroughly burned.

(2.) Long milling, in the experience of W.A., had not been found necessary with R.F.G. powder, and much less with R.L.G., and, if carried out at W.A., would seriously diminish the amount of powder that could be turned out.

(3.) Uniform grain would have the same effect in diminishing the out-turn, as the percentage obtained would be only 17 against 40 when the range of grain was greater, as 12 to 20. This does not hurt the private manufacturer, because he has plenty of call for the other sizes, but at a Government factory, where only one sort of powder is required, and nothing is sold, it would be a serious disadvantage.

(4.) Long glazing would also have a similar effect, though in a lesser degree.

A serious attempt, however, was now made to produce a powder which should be in all respects similar to Curtis and Harvey's No. 6, except uniformity of grain. The 12- to 20-mesh was chosen, as it was that of R.F.G., and would give on the average the same size of grain. And, as Curtis and Harvey's No. 6 was now being supplied by contract, the results of the samples sent to the R.L. for target proof were carefully noted. It was observed that within certain limits the higher densities and lower velocities of No. 6 made the best targets.

The first sample was made April 15th, 1872. The density was 1.784, and velocity 1,226 f.s. This was manifestly too slow a powder.

The next sample, April 23rd, 1872, had a density of 1.759, and velocity of 1,300 f.s. The density was still too high, and the shoot-

ing was not good. The mean figure of merit obtained at the Royal Laboratory, compared with Curtis and Harvey's No. 6, was as follows :—

Date of firing.	W.A.	Curtis and Harvey.
	Inches.	Inches.
May 6, 1872.....	12·77	10·57

With 90 grains, however, excellent shooting could be obtained.

The next attempt, May 28th, 1872, was quite successful, the density being 1·745, and velocity 1,328 f.s., and it was found to give results superior to Curtis and Harvey's No. 6. The shooting, compared with Curtis and Harvey's No. 6, was as follows :—

Date of firing.	W.A.	Curtis and Harvey.
	Inches.	Inches.
June 17, 1872.....	9·66	10·16
July 19, 1872.....	9·08	11·11
July 23, 1872.....	9·48	9·96
September 20, 1872.	8·83	9·55
Mean	9·26	10·44

This powder, at first called Q, and afterwards R.F.G.², has continued to give results superior to Curtis and Harvey's No. 6, the reason being that the average size of the grain is a little larger. Curtis and Harvey's No. 6 is all between a 14- and 17-mesh in size; but, of R.F.G.², one half is between a 12- and 14-mesh, one quarter between a 14- and 17-mesh, and the remainder between a 17- and 20-mesh. The greater range of grain makes little or no difference.

The charcoal is burned for 8 hours at a low temperature, and the milling is continued for 8 hours. The effects of slack burning the charcoal and long milling I have already explained. The glazing is for 12 hours, and seems to be a refinement by which the density of the exterior of the grain is increased, and thus more time is given for thorough and complete ignition.

Care has been taken to watch the keeping qualities of the powder, lest the effects of the low burning of the charcoal should become apparent, and samples have been preserved and fired from time to time, in some cases as long as three years. There is no doubt that powder made with slack burnt charcoal absorbs more moisture than that with more highly burnt charcoal. The greater density, however, of R.F.G.², powder helps to mitigate this tendency, and the samples which have been fired show no undue loss of velocity which could be attributed to an extreme absorption of moisture. The moistures, also, have been carefully taken from time to time.

The following are some of the results which have been obtained :—

Date of stoving.	New.		One year old.		Two years old.	
	Moisture	Velocity.	Moisture	Velocity.	Moisture	Velocity.
	per cent.	f. s.	per cent.	f. s.	per cent.	f. s.
September 12, 1872	·44	1,311	1·73	1,279	.. ..	1,298
October 2, "	·49	1,335	1·81	1,294	1·77	1,280
November 2, "	1·1	1,311	1·85	1,284	1·65	1,269
December 3, "	1·12	1,327	1·77	1,284	1·65	1,290
January 2, 1873	·89	1,313	1·77	1,281	1·9	1,273
February 3, "	·60	1,332	1·80	1,274	1·67	1,265
March 3, "	·64	1,308	1·65	1,258	1·72	1,260
April 3, "	·51	1,336	1·37	1,264	1·77	1,275
May 5, "	·9	1,343	1·45	1,266	1·5	1,274
June 2, "	1·1	1,327	1·72	1,274		
July 3, "	·82	1,337	1·3	1,267	1·52	1,269
August 4, "	·96	1,330	1·3	1,279		
October 4, "	1·15	1,314	1·4	1,275	1·7	1,282
Mean	·82	1,325	1·61	1,275	1·68	1,276

The average moisture of the samples when six months old was 1·55, and the average velocity 1,294 f.s., so that we may conclude that it takes one year before the powder attains to its normal condition, after which it remains stable, subject, of course, to the natural fluctuations of the season of the year, and the conditions under which the cartridges are made up and fired. As the samples of powder here under consideration were kept in small open kegs exposed to the air, it is probable that the absorption of moisture and loss of velocity were much greater than will be experienced with powder kept in dry store magazines, or safely sealed up in air-tight cartridges. There appears, therefore, to be no fear of the permanent keeping qualities of R.F.G.₂ powder.

The following will give some idea of the relative effects of density in materials, and manufacture. E. means powder the same as R.F.G.₂, in every respect except density. A. is the same as R.F.G.₂, excepting density. A.E. is powder having the same materials as R.F.G.₂, but manufactured as R.F.G.

In the Martini-Henry rifle the charge is 85 grains, and bullet 480 grains. In the Snider the charge is 70 grains and bullet 480.

Powder.	Density.	Date of firing.	Muzzle velocity.	
			In Martini-Henry rifle.	In Snider rifle.
			f. s.	f. s.
E March 8, 1875	1·654	March 15, 1875	1,370	1,299
A " " "	1·653	" " " "	1,338	1,222
A.E. " 11 " "	1·677	" " " "	1,340	1,241
" " " " " "	1·697	" " " "	1,338	1,230
" " " " " "	1·650	April 13, 1875	1,340	1,262
" " " " " "	1·729	March 15, 1875	1,343	
R.F.G. ₂ " 8 " "	1·726	April 13, 1875	1,321	
" " " " " "	1·62	" " " " " " .....	.. ..	1,264
" " " " " "	1·611	" 21, " " " " .....	.. ..	1,231

It will be observed that both the slack burning of the charcoal and the long milling have considerable effect in quickening the powder. Between E. and A. of the same density there is a difference of 32 f.s. in the Martini-Henry, and 77 in the Snider. And, allowing for density and greater age of powder when fired, A.E. excels A. in both rifles. These experimental powders were made when it was contemplated to have one powder for both Martini-Henry and Snider rifles. This could only be done by shortening the Martini-Henry bullet. The powder A. was rejected as unsuitable. The following are the comparative results with the other powders in the Martini-Henry rifle with 80 grains charge and 410 grains bullet.

Powder.	Density.	Date of firing.	Muzzle velocity.
E March 8, 1875	1.654	March 17, 1875.....	1,392
A.E. 11, „	1.677	„	1,362

It was not, however, deemed advisable to lighten the bullet, but the question became, could not E. powder be used with 80 grains with the 480 grains bullet. The velocity obtained, 12th May, 1875, was 1,315 f.s., almost identical with that of R.F.G., with 85 grains. It was found, however, to be too violent and split the cartridges.

In order to show how the same question is affected by an increase in the size of grain, with larger charges, I may give the firing of the following samples of field gun powders in the 9-pounder and 16-pounder guns.

Powder.	Size of grain.	Density.	9-pounder gun.		16-pounder gun.	
			Muzzle velocity.	Pressure.	Muzzle velocity.	Pressure.
P. and W.R.L.G. Lot 747	} 4 to 8 mesh. }	1.672	f. s.	Tons.	f. s.	Tons.
W.A. Experimental, R.F.G. dust.			1,395	10.7	1,369	13.8
October 3, 1873	} ½" cube	1.674	1,440	11.2	1,436	15.8
W.A. Experimental, common charcoal, Jan. 10, 1874			1,228	5.2	1,233	8.0

The densities being nearly alike show that the dogwood powder, though its grain is very much larger than the service R.L.G., Pigou and Wilks, lot 747, is a quicker powder; and this fact becomes still more apparent when contrasted with the January 10, 1874 powder of the same size of grain, and nearly same density, but made with alder and willow charcoal. The dogwood powder has been fired in a chambered 9-pounder gun with 3 lbs. of powder and 12½ lb. shot, giving a velocity of 1,700 f.s., with a very high recorded pressure of nearly 40 tons, showing that it is a violent powder.

I am able to pursue this investigation still further by contrasting the effects of dogwood and common powders in the 8-inch grain.

Powder.	Density.	Size of grain.	Muzzle velocity.	Pressure.		
				A.	B.	C.
			f. s.	Tons.	Tons.	Tons.
Hall and Sons .. } Dogwood powder Milled two hours }	1.82	1" cube	1,476	12.5	13.6	14.0
Hall and Sons ... } Dogwood powder Milled eight hours }	"	$\frac{1}{4}$ " "	1,447	20.6	20.4	19.4
" " " " } Dogwood powder Milled eight hours }	"	1" "	1,516	12.0	12.4	12.2
" " " " } Dogwood powder Milled eight hours }	"	$\frac{1}{4}$ " "	1,508	20.2	20.3	18.7
W.A. " December, } 1873, common powder	"	1" "	750	0.0	0.0	0.0
" " " " }	"	" "	780	0.0	0.0	0.0

These powders were almost identical as regards density, having been subjected to an extreme pressure of nearly 30 cwts. to the square inch. We have, therefore, a strong contrast of the differences caused by the nature of the charcoal, and also by the milling and size of grain.

Comparing Hall's dogwood inch cubes with the Waltham Abbey cubes made with common charcoal, we observe that the velocity with the latter is only about one-half of that with the former, and the pressure was not sufficient to crush the copper crusher gauges. In both cases, also, with the dogwood powders, the inch cubes give higher velocity than the five-eighths cubes, while the pressure is not much more than one-half.

With both sizes of grain in the dogwood powders the longer milling has proved beneficial in increasing the velocity and reducing the pressure. The date of firing of Hall's samples was September 19th, 1873.

They were fired again, November 14th, 1873, after being exposed night and day in open barrels to the weather since the first proof, with the following results:—

		Muzzle velocity.	Pressure.		
			A.	B.	C.
		f. s.	Tons.	Tons.	Tons.
Milled 2 hours	{ 1" cube	1,306	7.3	6.9	6.9
	{ $\frac{1}{4}$ " cube	1,233	6.0	5.9	5.8
Milled 8 hours	{ 1" cube	1,401	10.5	10.8	10.6
	{ $\frac{1}{4}$ " cube	1,399	11.0	10.6	10.8

This shows that the longer milled powder is very much the best able to resist the action of the weather. Of course no powder will ever be called upon to stand so severe a test of its keeping qualities as this powder was subjected to. My object, however, is to bring out the special features of the various powders.

I am able to go another step in the same direction. In making experimental powders for the 80-ton gun, powder from new materials and reworked from Merchant's L.G. have been used. It so happens that the L.G. powder used showed evident signs of the charcoal being slack burned, probably with the view of passing the old mortar proof successfully by giving a good range. It also, of course, received the extra milling necessary to convert it into the new powder. The contrast, however, is not nearly so strong as between dogwood and common charcoal, and the difference in milling is not great. The following are the results of two sets of samples fired preliminarily in the 38-ton gun.

Powder.	Density.	Size of grains.	Date of firing.	Muzzle velocity.	Pressure.		
					A.	1	2
				f. s.	Tons.	Tons.	Tons.
W.A. rework	1.82	2" cubes	4/12/75	1,350	15.0	13.7	15.2
Dec. 2, 1875	1.81	1.7" cubes	"	1,380	17.6	17.0	17.2
W.A. new powder	1.74	2" cubes	16/2/76	1,375	25.0	25.5	22.9
Feb. 5, 1876.....	1.76	1.7" cubes	"	1,387	22.3	22.2	22.5

Now what conclusion are we to draw from these apparently steadily consistent results. It would appear that the way to make the best powder is to prepare the materials with a view to make the powder as rapidly burning as possible, and then to moderate the combustion by density and size of grain. If the powder be not quick burning the density very much affects its rate of burning, and, as was seen with W.A. inch cubes of high density, the powder becomes much too slow for any gun. Now it will occur to most that, as soon as the pressure rises in the bore of the gun, the density of powder remaining to be burnt becomes very much increased; and, though the powder used be of low density and consequently quick burning on that account, it will soon become a slow-burning powder. This is the condition we most wish to avoid; and, therefore, it is better to start with as high a density as possible and have it naturally-quick burning, and thus the rate of combustion will be less affected when the pressure rises in the bore of the gun.

These conditions would, I believe, hold absolutely true were it not for another feature in the burning of grains of powder which accelerates the combustion of powders of lower density, though otherwise slower burning. I refer to the porosity of the grains, on which I more particularly dwelt in a previous paper read here. With the same density of grain, powders made with hard burnt charcoal are more porous than those made with slack burnt charcoal, because, the particles of charcoal being coarser, the spaces between will be proportionately larger; and also the particles of charcoal, being denser, will occupy less space, and so leave more room for interstices. The crushing pressure of these particles also we may suppose to be higher than with soft charcoal, which will enable them to build themselves up in accidental positions,

and thus give rise to uneven densities in different portions of the grain itself. Under the intense pressure in the bore of the gun the flame becomes forced into these spaces, and the less dense portions of the grain burn more rapidly than the harder portions, and thus give rise to that particular pitted and burrowed appearance of unconsumed grains of powder which are picked up after the discharge of the gun, with which we are all familiar. It is difficult to say how far the flame becomes forced into these channels, but the effect must be that from each small centre of penetration the combustion proceeds more rapidly as larger and larger surfaces come under ignition, and so an increased amount of gas is generated. It is a great mistake to assume that under all circumstances the combustion proceeds in regular successive laminæ from the surface to the centre of a grain of powder. With very high densities 1.82 to 1.84, when the powder probably has been subjected to a pressure equal to the crushing strain of the particles, I believe no appreciable interstices exist, and then the grain does burn regularly from surface to centre. The rate of burning then depends on the fineness of the particles of charcoal, each particle requiring to be consumed before the flame can reach the next to ignite it; and this no doubt accounts for the very marked difference in burning of W.A. 1" cubes of ordinary charcoal, and Hall and Sons 1" cubes of dogwood charcoal. With lower densities, however, the conditions are different, and, though the slack burnt charcoal still retains its greater rate of combustion, yet the greater certainty of porous channels, or unequal densities in the grains with harder charcoal enable it with more certainty to take advantage of the accelerated rate of combustion I have noted, and so tend to a great extent to reduce the difference in ultimate effect. It is mainly, in my opinion, due to this fact, that our cubical powder is able to match to so great an extent the prismatic powder used by some foreign governments. In the prismatic powders the channels are introduced into the grains of powder intentionally, so that there may be an accelerated rate of burning from them as centres as the combustion proceeds. The manner in which these holes are made, however, renders it uncertain whether their whole surfaces are ignited, as we find with pressed surfaces that they are generally only ignited from points; and, in fact, portions of grains of powder are often picked up of which the surface never appears to have been ignited. If the holes could be bored so as to give more readily ignitable surfaces, it is probable that the combustion would be much improved. Prismatic powder has to be made of much lower density than granulated or broken powder, in order to compensate for the greater difficulty of ignition.

It will be observed with prismatic powder that the sizes of the prisms are of no consequence provided that the channels are proportionately numerous and suitably placed. And in support of this notion I have advanced that our powders are porous, I will give the following results obtained by experiment with powders of different sizes of grain with the same density. The powders were pressed in the same press-box at the same time, so it is tolerably certain that their densities were identical. .

Powder.	Density.	In 8-in. gun, 35 lbs. charge, 180 lbs. projectile.				
		Muzzle velocity.	Pressure.			Length of cartridges.
			A	B	C	
W.A., Sept. 30, 1875. Rework		f. s.	Tons.	Tons.	Tons.	
1·5 inch cubes	1·76	1,471	16·2	15·5	15·1	20½"
1·7 " "	"	1,471	16·8	16·1	14·1	20½"
2·0 " "	"	1,452	15·7	15·2	15·2	21"

If we make allowance for difference in lengths of cartridge, these three samples give almost identical results in the 8-inch gun; and when we come to the 38-ton gun the larger cubes by no means show to advantage:—

Powder.	Density.	In 38-ton gun, charge 130 lbs., projectile 800 lbs.			
		Muzzle velocity.	Pressure.		
			A	1	2
W.A. Sept. 30, 1875. Rework		f. s.	Tons.	Tons.	Tons.
1·5 inch cubes	1·76	1,460	26·1	27·7	19·7
1·7 " "	"	1,440	27·3	26·5	24·5
2·0 " "	"	1,409	28·7	24·5	22·5

Take, however, the following samples of powders of equal but higher densities, and the effect of size of grain is very marked.

Description.	Density.	38-Ton gun.			
		Muzzle velocity.	Pressure.		
			A.	1	2
W.A. December 2, 1875. Rework		f. s.	Tons.	Tons.	Tons.
1·5 inch cubes	1·81	1,396	22·2	22·2	21·2
1·7 " "	"	1,380	17·6	17·0	17·2
2·0 " "	"	1,350	15·0	18·7	15·2

Both of these sets of samples were made from rework L.G., with the same description of slack burnt charcoal. I have already compared the latter 1·7 and 2-inch specimens with those of W.A., February 5th, 1876, of lower density made from new materials where the charcoal is more burnt. It will be observed that, with the February 5th, 1876, specimens, the pressures do not go by size of grain, showing that

the powder is porous owing to the low density ; and, as already stated, though the velocities are about the same as in the last samples given, the pressures are higher, which bears out my theory about the higher densities and quicker burning materials giving the best results.

Of course I do not give these samples as *proving* the question, but merely as illustrations of the features I wish to bring before you. We have had samples, especially those made by Messrs. Hall and Sons, of Faversham, of powders of low densities and hard burnt charcoal which have given the very best results. They have been tried, however, with powders only 1" cubes, and density 1.75, giving results too quick for the 38-ton gun with large charges.

This leads me to the consideration of the third and last feature I wish to lay before you. I believe the action in that case to be modified by the slow burning of the particles of charcoal themselves, these particles being so large and dense that, if we suppose an extreme case, all the particles may be ignited very rapidly, but the mean time of burning of the charge depends on the burning of a single particle. Charcoal has never been burnt at Waltham Abbey to an extent so as to produce this result, so that I am unable to give any accurate data as to how far this method may be carried out on a large scale. But I think it is worth investigation.

I may now sum the different features in powders for large guns, by which the rate of burning may be modified.

1. A quick burning powder, with a high density, and no appreciable porosity.

2. A moderate burning powder, with a moderate density, leaving moderate porosity.

3. A very slow burning powder, with very large porosity.

Powder may be produced to give very good, and possibly equally good, results, by any of these methods, but, I think, probably it can be produced best and with greatest certainty by the first method. It is, however, by far the most expensive, owing to the greater time required to manufacture.

The second method, with a slight tendency towards the first, is that by which powders have hitherto been made at Waltham Abbey. It is the cheapest, but it depends to a great extent on the most uncertain of all the qualities, viz., porosity. The only means by which this uncertainty can be neutralised is by systematic proof and careful mixing. When this is properly carried out, the results can be relied on with perfect certainty.

In all cases size of grain is a most important element which can never be dispensed with, owing to the facility which it gives for the complete ignition of the charge, and the total elimination of wave action, which is so very destructive to the bore of the gun. From observation of the good results which were obtained by Hall's inch cubes in the 8-inch gun, I was led to suggest the trial of 2-inch cubes for the biggest guns, for, if we double the diameter of the bore of the gun, we ought also to double the length of the side of the cube of powder required for it. With such large grains no wave action is now to be observed even if the charge be ignited in rear. It

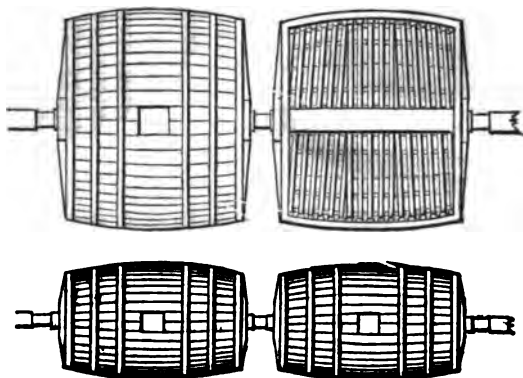
is, therefore, a safe and sound principle to keep the grains as large as possible, provided other qualifications are not unnecessarily sacrificed. Were, however, our heavy guns breech-loading, the result of my observations lead me to believe that, if the cartridge were ignited along the whole centre from the rear, smaller grain and denser powder could be safely used, and greater efficiency thus obtained.

I may mention a difficulty which has been encountered in the manufacture of these large cubes. In glazing in the ordinary manner, it has been found that the amount of heat generated is not sufficient to make the powder sweat in the glazing barrels. The portions thus rubbed off are not pasty enough to adhere to the sides of the barrel, but remain in a state of dust, which adheres to the cubes, and requires to be removed before the powder is finished and black-leaded. It is anticipated that, by using one large instead of four small glazing barrels, not only will this objection be removed, but larger units will be obtained for the after process of mixing. The system of mixing, and proof of pebble-powder, I have explained in a previous paper. It is obvious that if a sample of 130 lbs. of cubical powder be fired from each batch, the batches must be large to prevent an unnecessary expenditure of powder. By adopting a unit of 1,600 lbs. instead of 400, as in the case of pebble-powder, a batch of 16 times 1,600 lbs. can be obtained if four ordinary stovings be reserved before the powder is finished. For this purpose a finishing reel, to contain 1,600 lbs., has also been made. Cubical powder will not pass through a hopper in the same way as pebble-powder, because the grains are so large, but, by means of this mixer, it is anticipated that, if required, as many as 16 different batches can be made uniform, by taking a barrel from each for a run. The following diagrams will give an idea of the sizes of the glazing barrel and mixer as compared with an ordinary glazing barrel.

FIG. 2.

Large glazing barrel.

Mixer.



Ordinary glazing barrels.

These large cubes afford special facilities for taking densities, and an instrument was designed by me for this purpose. Where the grain of the powder is small, and the surfaces touch each other, the air has to be exhausted before the mercury is allowed to enter the globe in the ordinary densimeter; but in this new design, the cube is simply immersed, and it is found the air does not adhere to the surface when it is held by three small sharp points. Fig. 3 shows the design of the instrument. Fig. 4, the method by which the cube is held in its place, only one point being shown. The bulbs B give buoyancy when no powder is immersed, so that the point E just touches the surface of the mercury. When the powder is immersed, weights are added till the point E again touches the surface, and thus the density can be calculated. It has been found in taking the density in this manner that the cubes vary very considerably, and a large number have to be tried before an average result can be obtained. The cubes, however, after being operated on, can be returned again whole by simply brushing off any mercury which adheres to them.

FIG. 3.

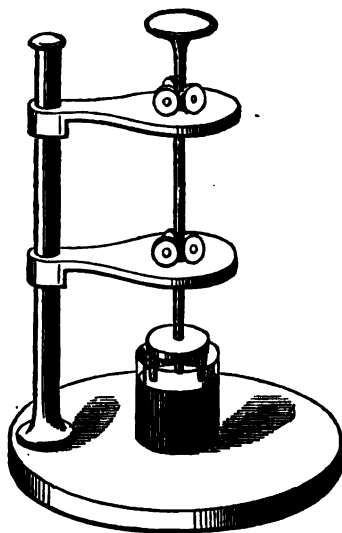
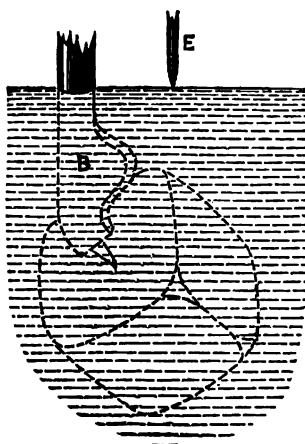


FIG. 4.



I trust that the remarks I have made will show how deeply interesting and important this subject is, and how steadily and surely light has dawned on us, with the aid of the proof tests, which were inaugurated and carried out by the Committee on Explosives. I have had the opportunity of studying the matter for now nearly five years, during perhaps the most interesting period; and I hope it may not be considered inappropriate to have laid the results of my observations before you. Though many of the deductions I have drawn are merely my own theories, they are the fruit of long and careful study, and they

will not, I feel confident, be lost sight of by those who have to do with powder at Waltham Abbey, or elsewhere.

The CHAIRMAN: I think it only remains for me to express what I am sure is the feeling of the meeting generally, the very great interest with which they have listened to the lecture, showing, as it does, an immense deal of research upon a very difficult, and if I may add, a somewhat dry subject. That dry subject has certainly been given to us mixed up with a great deal of interesting matter. In saying so, I should not lose sight of its great importance. For years past the whole of the military institutions of our country have been more or less under review, and we may add to that, that our ordnance, our rifles, and our powder have also been under review; and next to keeping our powder dry, which I look upon as most essential under the present circumstances of the world, the most important thing connected with this subject is, that we should have the best possible powder that we can possess. I believe Major Morgan has, I won't say actually solved the question, because I do not believe in finality in anything, and I think that it is quite possible, considering the great march we have made in the science of explosives as well as in the science of big guns and rifles, that some day or other an explosive superior to gunpowder may be discovered, but pending that time, I may say I believe we have arrived at almost as perfect a solution of the powder-question as can be attained under the present circumstances and with our present lights. I was pleased to observe that the lecturer divided his subject into two parts. He took first of all the small arms powder, and he brought us by gradual stages up to the latter, which he showed us was the best possible powder that could be produced under the circumstances, showing us that this was only done by long and patient perseverance, because as I understood, from 1869 to 1872, various experiments were made, and it was eventually proved that the best powder could only be produced by long milling and by slack burning of the charcoal. I observe our lecturer is in favour of breech-loading guns. He says, "I should prefer, however, to see our heavy guns breech-loading, and the cartridge ignited along the whole centre from the rear, when "smaller grain powder could be safely used and greater efficiency thus obtained." I have always supposed that in any breech-loading guns of heavy calibre, the explosion of a great mass of powder is an operation that would require a great deal of forethought to be carried out with safety. Certainly I do not suppose for a moment that which was called the *poudre brutale* could be used with any great safety. It may be quite possible, as our lecturer observes, that the small grain powder might be rightly or safely used, but there may be other reasons which I think I am hardly competent to go into, as to the gradual ignition of the powder, which I believe is an essential of the large grain powder in the guns, which might not make a small grain powder so useful for the purpose. On all these matters I speak with a great deal of humility. Though I am here in a particular position, presiding over a meeting which has listened with a great deal of attention to all that has fallen from our lecturer this evening, I do not think it is necessary and I certainly should be the last, to wish to go into a controversy on these matters. I had rather hoped that some gentleman in the meeting would have given us a few observations upon this most interesting lecture, and that the meeting generally should have been able to come to some conclusion after a discussion which would have been more or less favourable. It now, I think, only remains for me to express again the very great pleasure with which I have listened to a lecture most interesting as I have said, and most important; and I think there is an additional matter of interest pertaining to it, that it comes from a gentleman who has served at Waltham for the last five years with very great credit to himself and with very great advantage to the public; and when a gentleman like Major Morgan comes to an Institution like this, and is good enough to give us a highly scientific lecture, from which all of us can draw more or less profit, I am sure he is entitled to our very best thanks.

Rear-Admiral SELWYN: I should like, my Lord, with your permission, to ask the lecturer one or two questions. Perhaps Major Morgan would inform us first what the cost of dogwood is compared with the other charcoal, and also the increased cost due to the longer time required in working. Also what is the size of the cartridge made with a prismatic powder as compared with the cubic. I am asking,

in fact, very nearly, what is the specific gravity, but "size of cartridge," would convey a better idea to most of my brother Officers; if he would give us any idea of how much additional space is required by reason of the prismatic powder being (I suppose I must not call it less dense) but more porous, and the difference also between those two and the R.L.G. There is another question as to the wave-action of which Major Morgan spoke. Whether that wave-action is not more probably due to the slow starting and the continued push, as compared with the sudden action of the quicker powder than to any other peculiarity of the powder. And I should like also to observe on the question of hydrogen and oxygen contained in these powders Professor Macquorne Rankin's statement in this theatre some years ago (which is a perfectly sound authority upon the subject) was, that for every unit of oxygen present, eight units of hydrogen will be rendered nugatory, and as the total heat of combustion represented by the burning powder must also be the total effect of gaseous pressure, it is clear that not only is the whole of the hydrogen absorbed, but there is an excess of oxygen in a peculiar state which may possibly combine with the carbon, as I have had reason to see in other experiments connected with fuel, and produce a more vivid and intense combustion. It is under pressure and it combines with the carbon. One would say at first sight that the lower quantities of oxygen and nitrogen ought to give the better effect because less hydrogen would be rendered nugatory. As to the presence of gaseous matter, we must consider that powder, if it be properly burnt, all becomes gaseous, but the quantities of oxygen, hydrogen and nitrogen contained, besides the carbon, do affect the total heat of combustion in every case where combustion takes place, and very notably so. I think I might ask also whether there has been any change for the better in the velocities obtained over those obtained by the old powder. It was called *poudre brutale*. It was *poudre brutale* if fired under certain conditions and in certain guns, but the question will arise necessarily whether in seeking after a good gun, first we did not make a weak gun; secondly, whether in seeking after a powder to fit that gun, we have not made weak powder; and thirdly, whether in making that weak powder slow-burning powder, we have not necessitated much longer guns, which guns, I am sorry to say, seem likely to surpass very much the limits that can be afforded to them of space in casemates. I ask these questions simply to recall attention to the fact that we do not do wisely to overlay differences or conceal difficulties as they arise, instead of candidly and openly acknowledging them. The probability is that as soon as we have a powder to suit the Martini-Henry, we shall have to get some other form of rifle to suit the powder. It seems very doubtful whether this question ought not to have been gone into as the very first consideration in making artillery of whatever size—the powder first, the projectile second; the cartridge, if there be a cartridge, third, and last of all the arm.

Captain BURGESS: I should like to ask Major Morgan whether his attention has been drawn to a cartridge for heavy ordnance proposed by Mr. Scott Russell last year, in which he intended that the powder should be built up in the cartridge in hollow cylinders of powder, the centre being filled with condensed powder, so that combustion should take place from the centre, and that the cartridge case should be made of metal?

Major MORGAN: In the first place I am very much indebted to your Lordship for the kind way in which you have spoken of the paper I have read, and for the interest which you have shown on the subject. And, indeed, I may say I am most indebted for the accuracy with which your Lordship found out a flaw in this paper. I am aware I had no right to go into the subject of guns at all in reference to the matter in hand, and it was merely incidentally that I did so. I have a specimen of powder here, made by the Italian Government, three-eighths of an inch cube, and it is a slower burning powder than the Waltham Abbey two-inch cubes. It can never be used, however, in large charges, because you could not get the whole charge ignited; and the difficulty is the wave-action. The ignition takes place in one part of the cartridge, and unless it can be distributed through the whole charge, you get wave-action, which spoils the efficiency of the charge. The only way out of that difficulty with such a powder would be to ignite the cartridge up the middle and make radial channels, so as to communicate the flame to the whole cartridge as quickly as possible. I may say I am not in favour of breech-loaders to the extent

which has been supposed; and in the last paper that I read before this Institution I showed as far as I could, that our Woolwich guns are better than any continental guns. However, I have had the honour to propose a breech-loader, which I think is better even than them, and it is only with reference to that gun that I mention the subject. With regard to the cost of powder, I should think if you accept the saltpetre and sulphur, the cost of powder made as R.L.G. 2 powder would be about double that of ordinary powder, the cost of every operation in working with the dogwood powder being about doubled. If we can obtain the same results, as I believe we can, with careful mixing and careful proof, I think we shall have no cause to change our present manufacture. But I am not here simply to advocate or praise up any one system; I am here to bring forward, after the experience I have had, the special features of the manufacture, not with a view to the solution of the question, but simply to lay all the features before those who may have to do with powder at this or some future day. There are a great many questions that I do not feel justified in going into, and do not come to meddle with on the present occasion. It is quite sufficient to have brought the special features of the powder made, before this meeting without ranging to other subjects which, to a great extent lie beyond my province. The size of the cartridge for prismatic powder I should think would be less than that for pebble or R.L.G. It would be packed closer together, and would go in a smaller space. I agree with Admiral Selwyn that there is always a little excess of hydrogen to oxygen, but according to Dr. Percy, one of the best authorities we have on the subject, all the oxygen is positively detrimental and might as well be water in the shape of ice, so that it is not the quantity of gas that makes the rapidity of burning of the powder, but, as I have said, it is the fineness of the particles of the charcoal. With regard to what Captain Burgess said as to Mr. Scott Russell's cartridge, I was here and heard that lecture, which was most interesting in theory. His suggestion was similar to one that I entertained twelve years ago for my own gun, but whether it would succeed or not I could not venture to say until I had seen it tried. I do not believe in any theory that is not founded upon facts, for I have found in gunpowder-making that practice has led to entirely different results to those which were supposed would have followed on theoretical grounds. With regard to differences in powder, you can account for them all in this way—that we are all learning, and what we knew last year, we must alter our opinion about this year. At this time last year I could not have drawn the conclusions I draw now, and of course next year I may have to change my mind again. At the same time there is no reason why I should not lay the grounds of my present conclusions before those who are able perhaps to improve upon them, and to form an opinion and estimate at their value.

Colonel Lord WAVENY: I may notice a remarkable confirmation of what has been stated in reference to the powder adopted by the Italian Government. The only Italian gun which I have seen was rather less than the equivalent of our six-pounder, the calibre being 2.950, against 3.668 (six-pounder). It was a much longer gun than ours, which, as has been said, gives more complete combustion, and that is what we desire in this particular description of powder. I saw this gun fired with blank. It is a gun which may be very effectively used for the purposes of auxiliary forces. They have also guns equivalent to our sixteen-pounders, used for breaching service in the field. I did not see them employed. It is clear that an additional length would help the combustion of this more perfectly polished powder. I am glad to be able to give this confirmation of the theory laid down with regard to the additional length of guns requisite for the development of a thorough combustion.

LECTURE.

Friday, March 31st, 1876.

LIEUT-GENERAL SIR LINTORN SIMMONS, K.C.B., R.E., &c., &c.,
in the Chair.

THE COMPARATIVE COST OF THE ARMIES OF DIFFERENT NATIONS, AND THE LOSS TO A COUNTRY BY CONSCRIPTION.

By Captain J. C. ARDAGH, R.E., F.R.G.S., &c.

PART I.

THE subject which I have been asked to investigate depends mainly upon financial statistics, and is consequently dry, but in laying the results before you I shall endeavour, as far as possible, to dispense with superfluous figures, and to confine the numerical statements within narrow limits. Yet, as money questions are inseparable from figures, I must ask you to tolerate the inevitable.

In considering the comparative cost of different armies, the first question to decide, as a preliminary step to the investigation, is—the standard of comparison; and here, at the very outset, there is an extensive field for difference of opinion, apart altogether from the difficulties to be subsequently encountered in obtaining statistics and manipulating them.

A description of some of the more rough methods occasionally employed will somewhat clear the ground.

A favourite plan in England is to divide the amount of the Army Estimates by the number of soldiers on the establishment. It used to be said that our Army cost £100 per head per annum. The home and colonial establishment for this year numbers 127,562, and the Estimates amount to 14 millions. Dividing one by the other will give about £110 per head. From this it would appear that we do not now get as good value for our money as we formerly did; but, notwithstanding the increased cost of articles of consumption, or, what is the same thing, the diminished value of money, this is a transparent fallacy, for we really get so much more for our £110 now, than we did for our £100 fifteen or twenty years ago, when the Militia and Volunteers had not reached their present efficient state, that we have every reason to be gratified. The fallacy lies in this—that the peace establishment of the regular forces is a most inaccurate standard whereby to measure the military strength of the country. The Reserves, the Militia, and

the Volunteers are altogether omitted, and yet they constitute numerically far the more considerable portion of our forces. If we deal with Army Estimates "en gros," there seem to be only two modes which can give reliable results, each in its particular way.

The first is to take the average number of men kept continually under arms as a divisor; this will give a tolerably fair financial result. The second is to take the number of efficiently trained soldiers who could be produced on a sudden mobilisation—the ultimate war strength, in fact; which is the aim and end of our expenditure.

By the average number of men continually under arms is to be understood—

a. All the Regular forces.

b. A fraction of the Reserves, dependent on the number of days' training which they are to receive, which is at present somewhat uncertain. Twelve days was spoken of, and on that assumption one-thirtieth of the number may be included.

c. Under heading *c* come a fraction of the Militia, who are under arms for a month in the year, and their recruits, something over one-fourth of the total number, for two months. One-eighth of the number attending training may be taken as an average constantly under arms.

d. A fraction of the Yeomanry and Volunteers, more difficult to estimate from the peculiarity of their training, but one-thirtieth of the efficient may be assumed as a liberal average.

The numbers will then stand as follows—

<i>a.</i> All the Regular forces..	..	..	127,562
<i>b.</i> Reserves, $\frac{1}{30}$ th of 31,000	..	..	1,033
<i>c.</i> Militia, $\frac{1}{8}$ th of 118,000..	..	..	14,750
<i>d.</i> Volunteers, $\frac{1}{30}$ th of 180,750	..	..	6,025
Total average under arms ..			149,370

Dividing the 14 millions of the Estimates by this number, we arrive at the cost per man under arms as £93. It is hardly necessary to remind you that this includes great guns, small arms, military stores, fortifications, barracks, pensions, and everything else appertaining to the maintenance of the Army.

The other basis of calculation suggested, was the war strength of the Army—the number of efficiently trained soldiers who could be produced on sudden mobilisation.

This may be said to comprise, nominally—

<i>a.</i> The Regular Army ..	..	..	127,562
<i>b.</i> The Reserves ..	..	..	31,000
<i>c.</i> The Militia ..	..	..	118,000
<i>d.</i> The Yeomanry ..	..	..	12,000
<i>e.</i> The Volunteers, 168,750 (one-fourth)			42,188
Total war strength ..			330,750

It is scarcely necessary to point out that this is a maximum limit, and that the numbers actually forthcoming, would be below it. The same is true, but in a less degree, for other countries than England.

Dividing our fourteen millions by three hundred and thirty thousand, we have the cost per head of war strength £42 per annum.

If the Imperial troops on the Indian establishment and their cost, together with the whole of the Volunteers be added, the war strength would be raised to 520,000, and the cost per head diminished to about £36 per annum; but this is mentioned merely incidentally, and is not intended as a comparative statement. The introduction of the native forces in India, numbering 440,000 men, or of the Canadian Militia, whose active strength is 30,000, would only confuse matters still further.

In going so far, the military establishments of this country only have been dealt with, and purposely so, for a single example indicates the process followed in other cases.

The mode in which these figures have been arrived at is altogether empirical, and most of the details involved are matters of opinion. In the case of England, for instance, one critic may consider that the militia should be excluded from our war strength, while another may ask why only one-fourth of the Volunteers have been included, or why the Irish Constabulary are left out, and so forth.

In dealing with the statistics of foreign armies, the same class of difficulties arises. It is true that we possess the most complicated military system in the world:—we have a Home Army, a Colonial Army, and an Indian Army, all more or less interwoven; and we have Regulars, Militia, Volunteers, and native troops, with various terms and systems of enlistment. In other countries there is, in those respects, far more simplicity; but great latitude exists for difference of opinion. Is the French *réserve*, who has only served six months in the ranks, to be reckoned as a trained soldier? Are the hundred and forty thousand Cossacks of Russia to be counted as cavalry? No rigid rule can be laid down; the decision must be left to the discretion of the computer in each case; and it may be broadly assumed that, where the calculations have all been made by the same hand, the results are capable of comparison, which is the ultimate aim of the investigation.

What has been said regarding numbers, applies with still more force to money.

No two countries keep their budget accounts on the same system, and none give *complete* information regarding the cost of their troops in an accessible form. In the French budget, military pensions are borne on the Finance Estimates; while, in America, a very large Survey and Meteorological Department is charged in the Army Estimates. Russia maintains, perhaps, a judicious reticence. Austria gives most detail. France nearly as much. Germany less. England, America, and Italy, supply a very great number of figures, and a very small amount of information.

I have gone into them all except Russia, and I may say that

America gives no information at all, and in the very wide gap between America and the great Continental Powers, our budget comes in as a link—containing very much more than the one, and very much less than the others.

Before going further into details, it will be interesting to consider some other general relations between military expenditure in various countries. Table I has been prepared with a view of illustrating the incidence of the military burden on the purse and person of the inhabitants; and here it must be pointed out that, in different countries, the extent to which expenditure from general revenue reaches in local, county, or provincial matters, varies very widely. The county police in England, for instance, are paid from local rates; while the Italian carabinieri, who are, in fact, a gendarmerie, are really the *élite* of the regular army, and are of course paid by the State. The railways are, in some cases, in the hands of the state, and, in others, of private companies.

A great number of the roads and canals, and public works, in France, involving an annual expenditure of above six millions of pounds sterling, are administered by the State; while, with us, these are all matters of private enterprise. And to complicate affairs still further, the amount or proportion of the National Debt, and its charge on revenue, in various States, differs very widely.

The result is that the annual budget is not a very good comparative standard of the cost of government and administration. This, however, is not the place to remodel the financial systems of the world; and the discrepancies are only alluded to in order to avoid misconception.

Turning to the tabular statement of statistics, on line 3 will be found the amount of annual taxation per head of population obtained by dividing the budget by the population. The figures are tolerably uniform, with the exception of Russia and America. The proportionately small amount of taxation in Russia, 18s. per head, is accounted for by the fact, that there are several local governments within the Empire, which administer their own finances. The Grand-Duchy of Finland, the Kingdom of Poland, the Province of Courland, and others, have special local administrations and taxation apart from that of the Empire.

In America, as is well known, each State of the Union provides for its own internal administration, and the amounts voted by Congress are therefore correspondingly diminished.

France also labours at the present moment under the pressure of her new and enormous debt and the re-organisation of her Army; while, as already mentioned, the ordinary budget is swelled by Algeria and the Public Works sections.

The average taxation per head in the principal European States is about forty-five shillings per annum. England and France are above. Germany, Austria, and Russia, are below this average.

Passing to the amounts in line 5, obtained by dividing the Army Estimates by the population, the cost of the Army per head of population is arrived at.

The small sum of four shillings per head in America is very simply accounted for by the very insignificant force maintained. Russia, Austria, and Italy, stand at six shillings per head; England and Germany at nine shillings per head; and France at the top of the list with eleven shillings, mainly due to re-organisation.

The proportion of revenue spent on the Army varies from 13 per cent. in Italy, to 21 per cent. in Germany.

The next group of figures relates to the peace strength of the Armies. The average number under arms, computed in the manner already mentioned, varies between exceedingly wide limits. America has only 28,000, while Russia has 675,000.

The incidence of personal military service on the population in time of peace is illustrated by the next line of figures:—

In France, there is one man under arms for every 82 persons of the population. In Germany, 1 in 98. Then follow Italy, 1 in 124; Russia, 1 in 127; and Austria, 1 in 150. England follows with 1 in 212; but if the 63,000 regular troops employed in India be reckoned, we have one man under arms for 148 persons of population, or much the same as Austria, where strict economy is necessarily observed.

In America, finally, the proportion is only 1 in 1,500.

The next figure has already been mentioned. It represents the cost per head of the average force under arms in time of peace. The lowest cost appears in Russia and Italy, at £37 and £38 per man; then come three great European Powers, at substantially the same amount, viz., France, £43, and Germany and Austria, £45, per head under arms.

In England, the amount is more than double these last, viz., £93; and in America it rises to the enormous figure of £278 per man per annum. It is strikingly apparent that, even when every allowance is made for the costliness of the necessaries and luxuries of life in England and in the United States, the forces raised in those countries by voluntary enlistment are more expensive by far, if we are to judge by the estimates, than the armies of conscripts raised by the great European Powers: and we must conclude that, if the remuneration offered to the Anglo-Saxon soldier in the open labour market be fair, that which the conscripts are compelled to accept, is *inadequate*; and the balance which is withheld from them, although it does not appear on the face of any budget or estimate, is a virtual tax on the country;—but that bearing of the calculations will be discussed in the second portion of this paper.

The next group of figures gives the corresponding statistics for the war-strength of the various countries, the final line giving the cost in expectation or anticipation, not that of the war strength when fully embodied. These figures are very instructive. The war-strengths show the relative military power of the nations. The number of population per head of war-strength is an index of the pressure of conscription on the population.

In Austria 1 in 30 of the whole population can be placed under arms on mobilisation. France and Germany can produce 1 in 31, Italy 1 in 34, Russia at present is content with 1 in 50, while we have

in England and the colonies, except India, 331,000 available men, or 1 in 96 of the population of the United Kingdom.

It would appear from this that about one-thirtieth of the population is about the maximum force which the great military Powers can place under arms in time of war. If, however, America be an exception under ordinary circumstances, it must be recollected that during the war of secession there were above three and a half millions of men recruited or drafted into the armies on both sides, or one-ninth of the entire population.

The next lines—giving the cost per man in time of peace, of the war-strength; and the ratio which the war-strength bears to the peace-strength—afford a general idea of the economy and efficiency of the military administration.

At this point I have introduced statistics relative to the cost of a private soldier, but the consideration of them will be treated subsequently.

Another group of statistics relative to recruiting is subjoined, giving—The number of males annually attaining the age for military service, which, roughly speaking, is about one-hundredth part of the population, of whom it may be added but one-half are generally found available, the rest being unfit or exempted from one reason or another :—

The number of recruits taken and trained annually, divided into first and second portions of the contingent, the latter receiving only partial training :—

The proportion which the annual contingent bears to the whole population; and the *percentage* of those who come to the military age, who are trained.

And here some explanation is necessary. In England it is assumed that the recruits for the regular Army constitute the first portion of the contingent, and the Militia recruits the second. The volunteer recruits have not been accounted for, nor is the number annually entering the Royal Navy and Marines included. The recruits requisite to maintain the regular forces in India are, however, comprised as a set off. It must also be borne in mind that the recruits passed from the Militia into the line; 4,000 to 5,000 are counted twice.

In other countries the naval contingent has been excluded.

The number of recruits taken in the annual contingent is one of the best standards whereby to gauge the military training of a country, bearing in mind that the first portion are efficiently trained, and the second inefficiently; for the real military strength depends on the number of persons trained, however they may be classified, and by whatever name they may be called. Once a man is made a soldier of, he forms a unit in the military strength of his country as long as he can handle a musket, even though he may be temporarily lost sight of in the civil population. For if an emergency arises, that man can be induced to come forward again, and if the country be in danger there *should* be means, and there always *have been* means on such occasions to compel him.

We enlist annually 20,000 men for the Army (a number which

must be augmented annually in proportion as the new short-service men are passed into the Reserve, and which must ultimately exceed 30,000). The Militia takes 30,000 recruits, of whom 3,000 re-enrol, and 5,000 pass on into the regular Army. There is further a regular loss throughout from desertion, amounting to 15 per cent. in the regular service, or 3,000 per annum, but this is quite certain to diminish from the effect of short service and deferred pay.

It may be assumed that of the whole 50,000 recruits, at least 35,000 may be considered new and reliable, and if we can reckon on the services of those men, whether in the ranks or in the Reserve, for twelve years (Militia as well as regulars) we ought to be in a position to lay our hands on 400,000 trained soldiers in case of emergency, independent of the Volunteers. Those *fish* exist—what we want is a *net* to catch them.

The Militia.

In the tables which I have prepared, the Militia men are not specially dealt with, inasmuch as they have no complete analogy in any foreign State. The cost of a Militia man is easy to arrive at from the data already before us.

The total strength—Officers and men—cost, on the average, £10 per annum, as you may see from the Army Estimates. The private is, perhaps, not so well off as a Line soldier during the period of embodiment: but you must recollect that, under ordinary circumstances, he is far less subject practically to military law and to petty restraints than the Line soldier: he is among his friends and in his own county, and, on the whole, he regards his month's training in the light of an outing.

He is in these respects better off, but it is hardly necessary to say more; as, if the Militia is embodied for any long period, its conditions of service become almost identical with those of the Regulars.

The £10 per head, which has been mentioned as the cost of a Militia soldier, is merely a net sum from the Estimates, and will not compare with the £98 in line 9, Table I. It includes no share of administrative or non-effective services.

There is, however, a financial question regarding the Militia which I shall bring to your notice.

It has sometimes been said, that the same money which is now spent on the Militia would give better results if applied to increase the regular Army and Reserves; and I shall endeavour to show what you can have for your money in other ways. I shall assume that the substitutes are to be *bonâ fide* short service regiments, consisting of a cadre of old soldiers, and the rest enlisted for three years with the colours and nine years in the Reserve, forming four-fifths of the whole.

The cadre of an infantry regiment might consist of 26 Officers, 58 non-commissioned Officers, 40 corporals, and 80 long-service privates—in all 204—with 400 short-service men, coming in at the rate of 133 per annum, and being passed into the Reserve at something

less than that rate, and forming, with their nine contingents, about 1,000 men, when the system was fully at work.

I will not trouble you with calculations, but simply say that, for the £1,200,000 which we pay for 118,000 Militia, you could have 31 such regiments of 600 strong, or 18,600 men and 31,000 reserves, making in all 50,000.

This force of 18,600 men could not, of course, be sent abroad.

Now how does the comparison stand?

You could not have more than 30 or 40 cadres of regiments, whereas now you have 160 in the Militia, and that is a very serious drawback. Would your 50,000 men, of whom three-fifths would be reserves, be so much better than 118,000 Militia? Would they, in short, be more than twice as good?

I believe you will agree with me in voting for the old constitutional force, with the power of the ballot (unfair as it is) behind it.

And here it is well to draw attention to the division of all armies into two classes:—1st. The cadre, formed of the administrative, executive, and instructional portion, and the old soldiers; and, 2nd. The contingent—the recruits—or the rank and file, who are drilled, instructed, and moulded into soldiers by the others; and as soon as they are so trained, they ought at once to be passed into the Reserve. You can have a large cadre and a small contingent of recruits, or a small cadre and a large contingent, for the same strength, and about the same money. In the former case, you have a large number of trained reserves, and in the latter, you may have none at all.

An example will show how this bears on the cost and efficiency of an army.

In France, after the Crimean war, there was a nominal contingent of 100,000 men, which, however, was reduced to 79,000, by those taken for the Navy, those unfit for service, &c., before they became disposable. There were in force all kinds of ingenious systems for evading conscription, by purchase, substitution, replacement, &c. The nation would not submit to the improvements proposed by their rulers. The system of replacement or exoneration was profoundly rooted in the customs of the people. The first portion, 43,000 of the contingent, served for seven years, and the second portion, 36,000, for five months. Of the 43,000 taken annually to keep up the Army, at a nominal strength of 400,000, no fewer than 20,000 at one time used to obtain exoneration, most of them being replaced by the re-enlistment of old soldiers, who received a considerable bounty. The price of a substitute rose in fact to over £80. The consequence was, that the Army was really kept up by only 23,000 conscripts annually at one time, most of whom re-enlisted for term after term, becoming veritable “vieux grognards,” while there was no reserve at all.

It may be mentioned in comparison, that the number of recruits which we have taken in England for the regular Army has often surpassed that figure, and that too without a bounty.

They had then in France no reserve whatever of trained troops, and the result was—the disaster of 1870.

Now, instead of taking 23,000 only into the regular Army, they take

108,000, nearly five times as many, to keep up a strength of 440,000, or about 10 per cent. more than in the time alluded to.

That, it must be allowed, is a forcible example of how the number of recruits trained annually indicates the true strength of a nation, and will make it clear how desirable it is to have small cadres and large reserves, instead of old soldiers and nothing behind them.

Yet another instance of the applicability of the same principle of small cadres and large reserves will not be out of place.

The peace establishment of a battery of field artillery in most continental countries consists of 4 guns to a war strength of 6 or 8. When mobilisation is ordered the reserves come in, horses are requisitioned, and the reserve guns and waggons are paraded with the battery. The number of cadres is the same, but the number of guns is increased by half, or even doubled.

Now turn to our own Royal Artillery. They have an establishment in peace and in war of 6 guns, and the number of guns which we can put into the field can only be increased by increasing the number of batteries—by creating fresh cadres in fact. These new cadres can only be obtained by subtracting men and Officers from the existing batteries. If this *must* be done in war, it *ought* to be done in peace. A battery with a peace establishment of 3 or 4 guns may be raised to 6 or 8, and filled up with trained reserves, without losing its efficiency; but if you take one of the 6-gun batteries, split it in two, and make each half up to full strength with recruits, can you expect these new and unorganised cadres, and these untrained men to drop into their places at once, and be equal to batteries raised on the other system?

It all points to the moral, that to combine economy and efficiency you must have Small Cadres and Large Reserves, and this has a most material effect both on the apparent and on the real cost of an armed force.

The Cost of an Infantry Soldier in different Countries.

Hitherto only general figures have been dealt with; direct and indirect charges accounted for in the Army Estimates have all been massed together; and no distinction is drawn between Officers and men. I have endeavoured to work out the cost of an *army* in different countries, and I shall now try to lay before you the cost of a *soldier*. *Vide* Tables II—VIII.

As it would have been extremely complex to form an average including all ranks below Officers, and all branches of the service, the infantry of the line has been selected as being the backbone and numerical majority of all armies, and I have tried to put a monetary value on the advantages and inducements held out to the recruit on joining. (Table II.) These advantages are of a various character, and may be classed under three heads:—

1st. Immediate and direct advantages.

2nd. Prospective advantages.

3rd. Indirect considerations.

The *immediate and direct advantages* comprise:—

1. Pay, ordinary extra pay, and marching money.

2. *Food*, including rations of bread, meat, groceries, liquors, &c., and allowances in lieu thereof.

3. *Clothing*, including uniform, necessaries, boots, &c., and allowances for that purpose.

4. *Barrack accommodation*, and lodging allowances.

5. *Bedding*, furniture and utensils.

6. *Fuel*, for warming and cooking.

7. *Lighting*—candles, oil, or gas.

The *prospective advantages* include:—

8. *Good conduct pay*.

9. Prospect of increased *pay on promotion*.

10. *Gratuities* and presents.

11. Prospect of *deferred pay*.

12. Prospect of *pension*.

13. *Hospital and medical attendance*.

14. *Education*.

The *indirect considerations* are:—

15. Opportunity of earning in private employment while serving.

16. Diminished cost of amusement and travelling.

17. Alteration in social status of the Army.

18. Attractions and drawbacks incidental to military service, especially abroad, including loss of civil freedom, subjection to military law, and restrictions on marriage.

19. Prospect of obtaining a civil appointment on leaving the Army.

20. Risk and mortality in the Army, from war and bad climates.

It is at once apparent that many of these items are of such a nature as to render a monetary appreciation of their value impossible, and yet they cannot be omitted from consideration. The direct and prospective advantages can be calculated, and I have given the results in the table (II) appended to this paper, but only propose to call your attention to the general figures, and these amounts are, I beg you to observe, *absolute* and not *comparative*. It would be absurd, for instance, to conclude that, as a Russian soldier gets £10 per annum, and an American soldier £100, the latter is therefore ten times better off. In order to arrive at a comparative result, the condition of the soldier must be contrasted with that of the class from which he is drawn in his own country.

And here again there is wide scope for differences of opinion. What grades of the social scale are to be included? What are their earnings? Do they pay for their medical attendance and education, and provide for their poor, aged, and infirm? How are they affected by taxation? Are the necessaries of life cheap or dear? Is the climate hot or cold, equable or extreme? What do the inhabitants eat and drink? Are they frugal or luxurious in their mode of living? Is the population engaged mainly in agriculture or in manufactures? What is the value of money?—and a hundred other questions which are quite as difficult to answer as it is to discount the prospective advantage of getting into a theatre at half-price, or deciding whether that privilege is a fair set-off against the chance of having to wear a wooden leg.

¹ I have taken into account the additional inducements brought forward by the Secretary of State for War, when introducing the Army Estimates this year.

It is impossible to integrate all these considerations, many of them trifling in themselves, yet forming an important whole. You can only draw broad comparisons.

The principal is, that voluntary recruiting is apparently expensive. America and England pay respectively more than twice and four times as much for their rank and file as the countries where universal liability to military service is in force. In Russia, a soldier is fed, clothed, and housed, but his pay is so small—about a farthing a-day—that it is hardly worth taking into consideration. He has to serve simply for the necessaries of life. And this is the case to a great degree in the other continental countries—it takes a man his whole pay merely to live; and he is dependent on extra employment, in a civil capacity, on assistance from his family, or on the bounty of his friends, for anything he may have in the way of comfort and luxury.

These contributions form in many countries no inconsiderable part of the income of the soldier.

But the most important point to observe is—that the economy of conscription is not real. If a soldier is worth £40 per annum in the open market, and you only give him £20, you are robbing him of his time and labour to the extent of the £20 you withhold, and you thus impose an additional tax on the State by exacting that sum annually from every soldier you employ, instead of distributing it over the population generally, by an equitable system of taxation.

PART II.

Loss to a country by Conscription.

I shall now proceed to the second portion of the subject, viz., the loss to a country by conscription. It may be urged that there is no loss; but that objection will be incidentally disposed of in endeavouring to assess it. The question is one of evidence, and much of the evidence is based on opinion or even on prejudice. The general effect of conscription is so well described in a memorandum handed in to the Recruiting Commission of 1861, by Mr. Godley, then Assistant Under Secretary of State for War, a gentleman who was well known and highly esteemed by many now in this room, that an extract from that document requires no apology. Mr. Godley says:—

Mr. Godley's Memorandum on the Means of Recruiting the Army.

(Royal Commission on Recruiting, 1861, par. 1796).

“Conscription, which is at first sight and superficially a cheap mode of recruiting armies, is, in reality, the most expensive that can be adopted. It is a tax by lot, confessedly the very worst tax that a Government can impose. Where substitutes are allowed and provided, the tax is paid in money, and consists of the price paid for the substitute, the only difference between such substitutes and recruits, provided as ours are, being that in the former case the

"bounty is paid by the unfortunate individual on whom the lot has fallen, in the latter case by the public.

"The case is still harder with those who cannot afford to purchase substitutes; on them the conscription is a tax which takes at one swoop their whole capital, i.e., their labour and their time. It matters not what the value of that capital may be—whether they be skilled or unskilled, educated or ignorant, earning high or low wages, producing largely or producing nothing, down comes the relentless conscription, takes possession of them for the best part of their lives, and gives them in return hardly more than clothing and food. In these cases the pecuniary amount of the tax is represented by the difference between the value of the conscript's labour at his own calling and his pay as a soldier. But no pecuniary expression can represent the full amount of individual suffering and public inconvenience which must be the result of so extensive and violent a dislocation of labour. Compulsory service of any kind would be peculiarly injurious to a country inhabited by an enterprising and colonising people like the English. Such a people always sits loosely to the soil, and the prospect of a conscription would infallibly lead to a regular and large emigration of our best workmen, a class of whom we already lose too many. Of course if there is no other way of getting an army, we must have a conscription; but surely everything else ought to be tried before we have recourse to it."

This is the general view, and a very sound one; but it deals only with the hardships of the system of substitutes on the poor—the system of substitutes, an iniquitous injustice, devised to relieve the rich of their share of the burden.

A substitute is a voluntary recruit, whose bounty, as Mr. Godley points out, is paid—not by the State—but by the unlucky individual who is drawn in the ballot. The fine is the same, whether it be paid by a prosperous millionaire or a struggling artisan. The general practice has been a uniform rate of exemption, based on supply and demand. £40 was not an uncommon price for a substitute for the Militia in the beginning of this century. In France, it ranged up to £150, and the regulation price fixed by the Government was £80. In America, during the late war, the cost of a substitute rose as high as £100 or £200 above the £100 paid as bounty by the State; and if a ballot, with substitution, were resorted to in this country for the Army, it is certain that even these high figures would be exceeded. Now can anything be more unjust than this lottery of fines?

The system admits, it is true, of being improved, by introducing a sliding scale, based, for instance, on income, but the administration of such a method presents immense difficulty, and what after all is the difference between a system of graduated fines, and an item in the budget, for the provision of the sums required, in the annual Estimates? Substitution, then, at its best, is only equivalent to recruiting by large State bounties, a mode universally recognised as vicious.

Let the system of conscription without substitution, be now considered—universal personal service. There is a kind of abstract ideal

justice in it, but in practice it is a mere chimera. No nation ever has, or ever will arrive at the point of insisting on personal service to the last bitter drop.

The law of conscription in these countries which we refer to, invariably begins by declaring universal liability in the most emphatic way, and immediately proceeds to enumerate exceptions, giving privileges or immunities on one pretext or another, to at least half the people who are liable.

The exemptions are grounded on:—

1. Physical causes—as insufficient height or chest measurement, deformity or disease. These are inevitable.

2. Family reasons—as being the support of the family, an only son, having a brother already in the ranks, &c. These are also unobjectionable.

3. Social reasons—as being a minister of religion, a student in specified establishments, a doctor, or professor, &c. This is where the stumbling-blocks commence, I will give you an example. It would be *impolitic* to draft a Cabinet Minister, and it would be *absurd* to impress a bishop. Yet the extension of immunities to such classes as these distinguished persons may be the exponents of—when pushed to the other extreme—is equally ridiculous, for you come down to the postman and the parish-clerk, who, although their absence might be more felt in their respective spheres than that of the higher functionaries in their offices, could bring no equitable or valid reason for exemption on the ground of the duties performed.

These are types of the difficulties which have occurred. I believe the postman, or even any one whom he might employ to carry a letter, evaded the draft in the United States, on the ground of his being a Government servant; and certainly in Italy the embryo ecclesiastics managed to escape until within the last few years.

4. Voluntary service, combined with an educational test.

In Germany, a volunteer for one year passes a high test examination, the number of volunteers being limited; and the system has a most beneficial effect in stimulating advancement in education. In France, however, the spirit of the law regarding one year volunteers has been most disgracefully evaded. The Civil Commissions charged with the examinations, have admitted boys who could do little more than read and write; but this can, of course, be remedied.

In Russia, there is a system which, at first sight, is rather attractive. Those who have received certificates from a first class educational establishment only serve three months. Those with a certificate of the second class serve for six months; and those who can pass a special examination serve for two years. This applies to volunteers only, but conscripts have similar, though not so extensive privileges. The volunteers generally support themselves. Now, this admission of volunteers on an educational test, and on condition of self-support, is really, in a country like Russia, simply in favour of the rich and well to do, and consequently against the poor, who have to make up the numbers.

In Russia, only one-tenth of the contingent can read and write;

so the educated few practically get off altogether, or are made non-commissioned officers after a few months. In Italy, 43 per cent. can read and write; but education there is advancing with rapid strides. Austria is about the same. In France, 60 per cent. can read and write. In England, about 90; but we, too, are improving. Germany is at the head of Europe, with 96 per cent.

Then it must be considered that a great number of the men who are liable for conscription do not put in an appearance, and cannot be found; and of those who are mustered, many are put back temporarily for immaturity, or other reasons; so that the number dwindles down to something very far below what may be expected. In Germany about one-third are found available, in Italy nearly one-half. As an instance of how conscription affects the upper classes, about one-eleventh of the total contingent in Italy were proprietors, merchants, professional men, and students, whose enrolment must be considered as a very large pecuniary loss both to themselves and their country. In Austria, the persons exempted, from whatever cause, pay a fine instead of serving. In Italy, the one year volunteer pays £31 to receive the pay and rations of the soldier. In France, the volunteer pays £36, and the total amount paid by them to the State is 18 millions of francs, or £720,000 in the Estimates for 1876. That gives an idea of the value attached to a reduction of service to one year.

But the real way of ascertaining the cost of conscription is to calculate what recruits could be obtained for in the open market, as volunteers, and to consider the difference between this sum and what they actually receive as the indirect taxation representing what the nation pays in this unjust and unequal manner for submitting to conscription. In France a labourer earns about £29 per annum, and an artisan £37 and upwards. Taking £33 as an average rate to compare with the soldier's £20, we find that the State appropriates £13 from the earning power of each private soldier, and a higher sum from the non-commissioned officers. But it is enough to take the smaller sum.

368,000 men¹ at £13 each, make £4,784,000; and I have already told you that a fine of £720,000 is exacted from the volunteers; so the lowest estimate of the cost of conscription in France, regarded in this point of view, is £5½ millions, or 22 per cent. of the Army Estimates. Let us look at it from another point of view. A substitute used to cost 2,000 francs, or £80, that was the regulation price before the war, but it has often been higher. There were 164,789 recruits to be incorporated in 1876, of whom only 108,000 are to be taken as first portion. Suppose that one-third of these were voluntary recruits, the remaining two-thirds—72,000 men—were fined £80 a head by the

¹ Total	440,000	
Gendarmerie	27,000	
Officers	19,000	
Staff	26,000	
Permanent.....	72,000	72,000
Leaves rank and file.....		368,000

State, or something about £5½ millions, materially the same figure as the last, or about one-quarter of the whole cost of the army.

In these two calculations you will observe that only the labouring classes have been taken into account; and that the losses suffered by men of business, merchants, manufacturers, and persons of large property, have not been considered at all.

This limitation has been adhered to, mainly because the one-year volunteer system affords to those classes a loophole of escape. Yet the damage done to them and to the material prosperity of the country is far greater than is shown in the not inconsiderable sum I have mentioned.

But I must observe that universal liability has undoubtedly an excellent effect on the Officers, for it drives into the Army a number of young men of fortune and high position, who would otherwise perhaps do nothing, but who are glad to become Officers in order to avoid being conscripts. This inducement has hitherto been sadly wanting in France, but I venture to predict that thirty years hence the social status of the French Officer will have materially altered. In Germany the effect has long since been produced. To return, however, to the cost of conscription, I trust that I have made it clear that this 5½ or 5¾ millions in France is not the value of a mere sentimental grievance, but an actual taxation by lot, and a sum which ought to appear on the estimates, which, instead of being as they are 20 millions, should be 26 millions or more, the balance being made up by compelling men to work for three-quarter wages, the State appropriating the remaining quarter.

It is unnecessary to go through the same process for other States; suffice to say that France pays the best, and Russia the worst, that is to say that France appropriates the smallest percentage of the fair earnings of the soldier, and Russia the greatest.

It is a broad fact that all these nations pay their conscripts vastly less than the market rate of their service, and that the difference is made up by indirect means which equally bear upon the country, and are capable to a certain extent of evaluation.

It is urged by the advocates of conscription that it is a cheaper system than voluntary enlistment. Nothing can be more fallacious than to suppose so. If we adopted conscription to-morrow, and only paid men a farthing a day (as is done in Russia), giving them, besides, the mere necessities of life, there would be an apparent saving of £15 to £20 per man per annum; but that apparent saving is no real gain to the country, it is only a capitation tax on the conscripts which ought to be levied on the country in general. But they say: "You get better men." Undoubtedly you do, but at a loss to the community at large. You take a man who is earning a pound a day, and you give him a shilling or a farthing, and the gross earnings of the country are decreased by the difference between what pittance you choose to accord to him, and the fair remuneration of his skill or talent. There is no economy in robbing Peter to pay Paul, and there is no justice in compelling Paul to work for one-twentieth part of the wages he can obtain in the open market.

Conscription is only justifiable when the necessities of the country compel its Government to develop its military resources to the fullest extent—when it becomes necessary to train the great bulk of the able-bodied population to arms—as is now the case with most of the great Powers. If every available man is taken at a certain age, there is at least no injustice to individuals, although the higher classes suffer far more than the lower.

If even a moiety of the available men are taken, there is but small ground for complaint. But it is entirely different when you only want, as we do, a very small proportion of them, and that small portion for exceptionally arduous duties, which they are quite ready to insure themselves against if the premium is small, as it would be in England.

I am sure that the notion of sending a conscript to the West Coast of Africa, or even to India, can never be seriously entertained. In short, we never ought, and never will, apply conscription to recruiting except for the Militia, and then only as a *dernier ressort*.

The question of economy in military administration, as a consequence of conscription, can never come into operation in this country. We *must* raise the wages and inducements to enlist voluntarily, *pari passu* with the cost of living and the demand for labour; and when the moment comes for enforcing conscription, it will be impossible to turn round and say to your conscripts—we do not intend to pay you as much as a volunteer, although we admit you are worth more. There can be no saving then in that way.

On the contrary, it is most probable that every reasonable addition will have been made to the inducements to enlist, previous to conscription, and these cannot be immediately withdrawn.

As the question of conscription for our own Army has been already ventilated within these walls, I shall only remind you that, in addition to the objections and injustices which surround it in other countries, we should have to superadd our Indian and Colonial service—banishment, most likely to an unhealthy climate. That single condition is sufficient to render conscription for the regular Army, as now constituted, impossible. No minister could venture to propose a measure which would render the population liable to exile as well as to compulsory service, for it is beyond a doubt that we have never had a difficulty in obtaining men for those arduous duties, which could not have been avoided by some foresight and a little money; and which was in fact got over, without even the suggestion of resorting to such an iniquitous injustice as conscription for Indian and Colonial service would be.

I must remind you, moreover, that during the struggle for existence in America, during which 3,700,000 men were under arms on both sides (about one-ninth of the entire population), there was *no* time that a substitute could not be procured, although the price sometimes ran very high. It was enthusiasm and patriotism which brought the best men in America into the army, and not the compulsion of the draft: and I venture to say that those motives are by no means extinct in this country.

Conscription may in some cases be an inevitable necessity, but viewed in any aspect is a costly injustice, and the fewer the men required in proportion to those liable, the greater is the unfairness to the unfortunates who are drawn. As we have no intention of training the whole population to arms, the necessity for resorting to conscription for the Army seems remote; but our previous experience of the working of the existing law for militia-ballot ought to be a warning to us to advocate such alterations in the Act as will make it really efficient if it ever has to be put into operation, for it is now lamentably out of date, and is universally admitted to be unsuitable.

I shall only add a hope that the system of *small* cadres and *large* reserves may render a resort to conscription unnecessary. There are plenty of men to be had at the market price, and if John Bull wants more, it will be cheaper for him to put his hand in his pocket in time of peace and maintain a reserve, than to resort to a levy of raw recruits on the outbreak of a war.

APPENDIX.

TABLE I.—Statistics relating to the Cost of Armies in different Countries.

	England. 1876.	France. 1876.	Germany. 1876.	Russia. 1874.	Austria. 1872.	Italy. 1873.	America. 1875.
1 Population	31,628,338	36,102,921	41,000,000	85,685,945	35,904,436	26,801,154	42,000,000
2 Gross annual expenditure	£76,966,310	£103,000,000	£37,000,000	£79,000,000	£73,000,000	£60,000,000	54,000,000
3 Taxation per head of population	£2 7 0	£2 17 0	£2 2 0	£0 18 0	£2 0 0	£2 5 0	£1 6 0
4 Gross Army estimates	£14,483,300	£20,000,000	£19,000,000	£25,000,000	£11,000,000	812,000	7,600,000
5 Cost of Army per head of population	£0 9 0	£0 11 0	£0 9 0	£0 6 0	£0 6 0	£0 6 0	£0 4 0
6 Percentage of total taxation spent on Army	.19	.19	.21	.16	.15	.13	.15
7 Average number under arms—peace establishment	160,000	440,000	419,000	675,000	238,000	217,000	28,000
8 Head of population to one man under arms—ditto, ditto	212	82	98	127	150	124	1,500
9 Cost of Army, all ranks, per head—ditto, ditto	£93 0 0	£43 0 0	£45 0 0	£37 0 0	£45 0 0	£38 0 0	£278 0 0
10 Average number under arms—war strength	331,000 ex. volunteers.	1,150,000 ex territorial army.	1,315,000 ex Landsturm.	1,696,000 ex irregulars.	1,137,000	770,000	
11 Head of population to one man under arms—ditto	96	31	31	50	30	34	
12 Cost of war strength in time of peace, per head	£42 0 0	£17 0 0	£14 0 0	£15 0 0	£9 0 0	£10 0 0	
13 Ratio of numbers — peace strength to war strength	2.20	2.61	3.14	2.50	4.77	3.55	
14 Ratio of cost—peace strength to war strength	.45	.39	.31	.40	.20	.26	
15 Pay, rations, clothing and housing a private of Infantry	£37 10 0	£21 0 0	£17 16 0	£10 4 0	£13 1 4	£15 8 3	£97 5 0
16 Prospective advantages enjoyed by a private of Infantry	£18 11 0	£5 1 0	£7 7 5	£1 5 0	£7 11 2	£5 2 6	£11 8 8
17 Total cost of an Infantry soldier to the State	£58 1 0	£28 1 0	£25 3 5	£11 9 0	£20 12 6	£20 10 9	£108 13 8
18 Wages of a labourer	£40 0 0	£29 0 0	£30 0 0				
19 Wages of a tradesman, artisan, or mechanic	£65 0 0	£37 0 0					
20 Number of males attaining military age each year	280,000	300,000	490,000	800,000	337,000	250,000	400,000
21 Annual contingent of recruits, 1st portion—Regular	20,000	108,000	..	..	89,000	50,000	
22 2nd portion, or Militia	30,000	56,000	..	..	58,000	35,000	
23 Total recruits	50,000	164,000	149,000	150,000	147,000	85,000	4,000
24 Proportion of annual draft to population	1 in 632	1 in 269	1 in 275	1 in 566	1 in 244	1 in 315	1 in 13,500
25 Percentage of men attaining military age who are trained	.18	.56	.31	.19	.43	.34	.01

TABLE II.—*Estimate of the Pay and Allowances, Direct and Prospective Advantages, of a Private Soldier in the Infantry of the Line in various Countries.*

IMMEDIATE AND DIRECT ADVANTAGES.		England.	France.	Germany.	Russia.	Austria.	Italy.	America.
		£ s. d.	£ s. d.	£ s. d.	£ s. d.	£ s. d.	£ s. d.	£ s. d.
1	Pay—Ordinary extra pay and marching money	18 10 0	7 4 7	9 7 1	0 10 10	2 3 10	..	23 10 0
2	Food—Rations of bread, meat, groceries, and liquor	11 3 2	7 19 9	2 16 0	6 3 8	6 14 7	14 0 0	37 15 0
3	Clothing—Uniform, boots, necessaries, and allowances	4 2 5	3 11 8	3 0 4	1 14 6	1 18 10	..	12 0 0
4	Barracks—Lodging or allowance	2 12 0	1 8 7	..	..	1 10 0	..	..
5	Bedding—Blankets, sheets, straw, furniture, utensils	0 2 5	0 8 6	2 12 7	1 5 0	0 8 7	1 8 3	14 0 0
6	Fuel—For warming and cooking	1 0 0	0 6 11	..	..	0 2 6	..	..
7	Lighting—Candles, oil, or gas	..	..	..	..	0 3 0	..	..
	Total A	37 10 0	21 0 0	17 16 0	10 4 0	13 1 4	15 8 3	97 5 0
PROSPECTIVE ADVANTAGES.								
8	Good conduct pay	1 4 9	1 18 0	1 0 0	..	0 16 9	..	..
9	Increased pay on promotion	5 10 0	1 6 0	1 6 0	0 2 0	0 11 0	0 9 0	6 0 0
10	Gratuities and presents	0 5 0	..	..	0 2 6	..	..	..
11	Deferred pay	2 10 0	..	..	..	..	..	..
12	Pension	7 4 8	0 19 7	4 0 0	..	..	..	..
13	Hospitals and medical attendance	1 7 0	0 14 9	0 19 4	1 0 0	4 14 9	4 5 4	2 5 0
14	Education	0 10 0	0 2 8	0 2 0	0 0 6	1 8 0	0 8 2	1 13 8
	Total B	18 11 0	5 1 0	7 7 5	1 5 0	0 0 8	..	0 10 0
	A + B	56 1 0	26 1 0	25 3 5	11 9 0	7 11 2	20 10 9	118 8
						20 12 6		103 13 8
INDIRECT CONSIDERATIONS.								
15	Opportunity of earning in private employment	Insignificant.	Moderate.	Good.	Very considerable.	Fair.	Fair.	..
16	Diminished cost of amusement and travelling	Nil.	..	Greatly improved.	Very appreciable.	Improved.	Improved.	..
17	Alteration in social status	Negative.	Improved.	..	..	..	..	..
18	Attractions of an adventurous career	Considerable.	Very	Very good.	..	Fair.	Fair.	..
19	Prospect of civil employment	Nil.	Good.	..	..	..	..	..
20	Risk and mortality from war and bad climates	Considerable.	..	..	..	..	..	Small.

TABLE III.

ENGLAND.

*Cost of an Infantry Soldier.**Army Estimates, 1876-7.*

		Per diem.	Per annum.
		<i>s. d.</i>	<i>£ s. d.</i>
Vote 1.	Pay	1 0	18 5 0
"	Additional pay (future)	0 2	3 0 10
"	Good conduct pay and skill at arms .. $\left\{ \begin{array}{l} \text{£} 97,000 \\ 70,287 \end{array} \right\}$	0 8	1 4 9
" 10.	Provisions	$\left\{ \begin{array}{l} 1,368,000 \\ 122,500 \end{array} \right\}$	11 3 2
"	Paillasse, straw	$\left\{ \begin{array}{l} 14,730 \\ 122,500 \end{array} \right\}$	0 2 5
"	Fuel and light, half of	$\left\{ \begin{array}{l} 233,130 \\ 122,500 \end{array} \right\}$	1 0 0
"	Lodging or barracks		2 12 0
" 11.	Clothing, rank and file		3 1 5
"	Great coat, leggings, gloves, and necessities	$\left\{ \begin{array}{l} 131,000 \\ 195,000 \end{array} \right\}$	0 14 0
Share of free kit on joining			0 7 0
Vote 4.	Hospital and medical attendance and medicines ..		
£262,000 total vote. $\left\{ \begin{array}{l} \text{.....} \\ 195,000 \text{ Army and Militia.} \end{array} \right\}$			1 7 0
Education		$\left\{ \begin{array}{l} \text{F } 61,400 \\ \text{G } \\ \text{H } 122,000 \end{array} \right\}$	0 10 0
Chelsea and Kilmainham		$\left\{ \begin{array}{l} 26,000 \\ 122,000 \end{array} \right\}$	0 4 3
Out-pensions		$\left\{ \begin{array}{l} 1,220,000 \\ 185,000 \end{array} \right\}$	7 0 0
			50 11 10

TABLE IV.

FRANCE.

Cost of an Infantry Soldier from French Army Estimates, 1876.

	Francs.	£	s.	d.
Pay.....	150 38	6	0	4
Wine, beer, spirit.....	4 70	0	4	0
Marching money.....	1	0	0	10
Necessaries' fund.....	36 50	1	9	2
Supplement.....	29 20	1	3	5
Gross pay.....	221 78	8	17	6
Deduct hospital or furlough.....	22 17	0	17	11
Net pay.....	199 61	8	0	0
Clothing.....	53	....		
Provisions (see below).....	..	2	2	2
Lighting.....	5 36	0	4	3
Hospitals.....	19 70	0	14	9
Bedding.....	10 62	0	8	6
Maintenance of arms.....	1 60	0	1	4
Fuel—warming and cooking.....	8 60	0	6	11
Pensions borne by finance estimate and mainly caused by the war 66,000,000 × £430,000.....	15 30	0	12	9
Ecoles regimentaires.....	$\left. \begin{array}{r} 1,388,000 \\ 430,000 \\ \hline 696,000 \end{array} \right\}$	3 28	0	2 8
Invalides.....	$\left. \begin{array}{r} 430 \\ 3,332,000 \\ \hline 500,000 \end{array} \right\}$	1 62	0	1 4
Secours.....	$\left. \begin{array}{r} 430 \\ 3,332,000 \\ \hline 500,000 \end{array} \right\}$	6 66	0	5 6

France, 1876, p. 754, cost of Rations to State.

	c.	Per annum.
		£ s. d.
750 grm. bread.....	·22	} 26c. is deducted from pay, leaving extra cost 13c. }
300 grm. meat.....	·39	
Sugar, coffee.....	·11 7	
		6 19 0

Extraordinary or field rations.

Rice and salt	·02	}	} 1 7 0
Brandy every three days	·07		
One year Volunteer pay 900 francs.			

TABLE V.

GERMANY.

Cost of an Infantry Soldier from Estimates, 1876.

	Marks.	£ s. d.
Pay of a private	126	6 6 0
Allowances in garrison	61	3 1 0
Bread ration	56	2 16 0
Clothing and equipment	60·3	3 0 4
Barracks, fire, and light	30·5	1 10 6
Additional ditto	2·1	0 2 1
Hospitals and medical staff	19·8	0 19 4
	£	
Education of privates, &c..... { 689,000 }	2·05	0 2 1
	1·4	0 1 5
Invalid houses..... { 311,000 }		
	358·7	17 18 9
Pensions not in Army Estimates.		
Mean prospect of increased pay on promotion.....	26	1 6 0

	Marks.	Marks.
Lowest pay 10·50 per month =	125	0
Mean pay 12·7 „ =	152	4

The daily bread portion is 750 gr. 1·5 pence is deducted daily from the soldier's pay for his mid-day meal. If this is insufficient a supplement is issued calculated on the cost of provisions.

Ration—Small.	Large.
150 gr. raw meat	250
92 rice	118

or certain equivalents in meal, vegetables, potatoes, &c.

A fuel ration is for a room holding from 4 to 8 men. A room for 12 men receives 1½ rations. A ration is ⅓th part about of a klafter of wood.

Oil is issued to rooms for the winter months, 12 loth in all per annum.

Privates have 40 lbs. hay or 65 lbs. straw per annum for bedding.

TABLE VI.

AUSTRIA.

*Estimated Cost of Infantry Soldier.**Estimates 1871.*

	Gulden.	£ s. d.
Menage	44·2	4 8 4
Brot	22·21	2 4 5
Kasern-Servis	4·37	0 8 8
Betten Stroh	·73	0 1 5
Zusammen	71·51	7 3 2
Betten Nachschaffung	2·11	0 4 2
„ Ausbesserung u. Reinigung	1·50	0 3 0
Montur und Rüstungs-Gebühr	19·40	1 18 10
Löhnung	21·90	2 3 10
Feuer-Gewehr-Reparatur	·53	0 1 7
According to Estimates	116·95	11 13 11
Sanitätswesen..... { $\frac{3,137,106}{224,000}$ }	14	1 8 0
(There are 5 per cent. in hospital at a cost of 123 g. per head.)		
Versorgungswesen { $\frac{10,623,183}{224,000}$ }	47·4	4 14 9
Invalid Hospitals and Pensions.		
Unterricht—Ausbildung	·33	0 0 8
Unteroffiziers-Dienstes-Prämien	178·68	17 17 4
Prospect of increased pay	8·4	0 16 9
	12·	1 2 0

Bread rations—black bread—875 grammes, costs 1·6 pence.

Meat ration 185 grammes.

Tobacco at reduced price.

TABLE VII.

ITALY.

Cost of an Infantry Soldier.

Estimates 1874.

		Lire.	Lire.	£ s. d.
Daily pay (<i>soldo</i>)		43		
Bread money		25		
Service allowance (<i>assegno individuale</i>)		14		
<i>Deconto</i> (includes clothing, boots, &c.)		14		
		96	350 40	14 0 0
Corpo veterani ed invalidi. ... { 1 251 000 }	....		6 43	0 5 4
	195 000			
Servizio sanitario	1 907 300	....	9 77	0 8 2
	1 95 000			
Pane e viveri (included in pay) { 22 713 000 }	....			
	1 95 000			
Letti, legna, lumi, casermaggio { 4 247 000 }	....	21 70	0 18 1	
	195 000			
Transporti materiali, &c. ... { 1 919 000 }	....	9 80	0 8 2	
	195 000			
Immobili	575 000			
	195 000	3	0 2 6	
Pensions	195 000 000	....	100	4 0 0
	195 000			
Arms Accoutrements			501 10	20 2 8
Cost of Levy .....		....		0 10 0

A one year Volunteer Infantry pays 620 lire and receives pay, clothing, &c., as a soldier.

The Estimates calculate the average cost per man under arms (not including works and buildings, &c.), at 700 to 900 lire per annum.

Bread ration 941 grammes. Costs 2·2 to 2·4 pence. Meat ration 200 grs.

Tobacco at reduced price.

Levy of 1873, 65,000 (1st.) 35,000 (2nd.)

Total number dealt with 278,751

Rejected under 5' 1" 21,603

Deformed or diseased 49,979 } 141,350

Only male, eldest son of widow, and other family reasons 69,768

Remaining to be drawn from..... 132,401

TABLE VIII.

AMERICA.

Cost of an Infantry Soldier.

	Dollars.	£ s. d.
Money pay—average	180	36 0 0
Additional pay \$2 per month after 5 years.		
Bread, meat, and groceries	168	37 15 0
Clothing	60	12 0 0
Lodging, fuel, and light—Est.	65	13 0 0
Bedding .....	....	1 0 0
Hospitals free—Est.....	3.40	0 13 8
Medical attendance, say	5	1 0 0
Education, say .....	....	0 10 0
Asylums—Pension, say.....	....	1 0 0
		102 18 8

Reputed cost of a soldier £200 or 1,000 dollars per annum.

One dollar per month is kept back as reserved pay and handed over in a lump at the end of 5 years. 60 dollars = £12. The effect has been to diminish desertion.

No Pensions allowed, except in cases of disabilities from wounds and other causes incurred on duty.

Commodious asylums provided for old and disabled soldiers.

Colonel Lord WAVNEY, A.D.C., F.R.S.: I am quite sure, Sir, that you will not think I am anticipating a very pleasant duty that falls upon you when I express the satisfaction with which we must all have received the statements made by the lecturer on this occasion, and if I take exception to some few of his inferences and permit myself to supplement some of his statistics, he will, I am sure, believe I do it in an earnest desire to co-operate with him. In the first place as a Militia Officer myself, I thank him for asserting the principle of small cadres and large reserves, as compared with the system of a small concentrated force as alternative to a large expensive body. There are some points of consideration also with regard to that service. The service is capable of much larger expansion than is usually understood, even with the present disqualification of the high price of labour which necessarily draws away so many. Having commanded a Militia-regiment for many years, I have had an opportunity of testing the materials from which we draw our recruits, and I find that in the agricultural districts, to which alone you can look for a permanent supply, the rural population is diminishing to a certain extent, and only that portion who cannot obtain engagements for the whole of the year, come to us in the Militia. There is no doubt an arrangement by which it is possible to have the three months' training of the recruit in the winter months instead of his being called up, as was originally the case, when the men were under arms for training. This expedient was adopted in the brigade I have under my command, and as to the result, it was taken advantage of by a fine body of young men,—the finest I have seen since entering the service—comprising those who could not find subsistence during the whole of the year, and who therefore were presumably more likely, this being an agricultural district, to be out of employment in the winter than in the summer. Those three-month men will be dismissed to-morrow. During the winter, we employ them in drill and in gymnastic exercises, and I must say, after twenty years' service, I never saw a body of soldiers of three months in better trim. There is another point with regard to recruiting for the Militia and the ballot. It is not generally known that in remodeling the Militia Acts of 1853, a power was reserved in supplement of the voluntary enlistment—that is to say, the Militia service is told off for recruiting into divisions and districts in each respective county, and a certain number of recruits is allotted to each. But if this number be not obtained by voluntary enlistment, there is a power to ballot under the Act to raise the determinate number of Militia soldiers. At the present time it is unnecessary that we should revert to that course. Very fortunately the principle of small cadres, well carried out in the Militia-service, is amply sufficient, and indeed I am inclined to think if we came to verify the particular proportions of men enrolled in each Militia regiment, we should find the cadre system was practically and fairly and absolutely adopted. If it be well developed, I will answer, from my own experience, for making up the full strength and establishment of the regiment, so soon as there is prospect of so much of Garrison and foreign service as we were permitted to undertake during the Crimean War and the Indian Mutiny. And now I would go to the point of conscription for the Army in the country which has carried it, as I think, most beneficially into effect. I have returned recently from Italy. The conditions of Italy are peculiar. The Army is a necessity of constitutional existence, and to maintaining a place in the European system for the Italian people, so much so, that it has become with them a proverb, "The Army made Italy by its battles; the Army will make the Italians its education." The conscription in Italy,—and here to a certain extent I venture to differ with the lecturer—is carried out absolutely without exemption, except of course such as are necessary and consistent, that is to say, not to take the widow's son, or the support of the family, or professional men. A very remarkable occurrence has recently taken place. The Italian government has met with exceed-
 ing obloquy because it insisted that the pupils at the universities or seminaries for educational purposes should not be exempt from service in the ranks. It was discovered that this was evaded, and that Italians passed off into the foreign universities without serving. At last it was decided that what we should call an undergraduate must take his turn of service in the ranks, but there was the means of shortening the period by joining the one-year engaged soldiers. Therefore they are as much subject to conscription, only they have to learn their duty in

a shorter time, saving the money of the State, but in a term which probably, considering their superior education, will be quite sufficient to enable them to acquire the habits of the soldier, amongst whom they live in barracks, whether in separate "chambres" I do not know, but they do duty as private sentinels. With regard to figures, I am not inclined quite to agree with the lecturer, either as regards America or Italy. The most clear, definite and accurate detail of the operations of any army that I have the good fortune to know, was that which was presented by the War Minister for America—I think Secretary Stanton—the year after the close of the great struggle. It has also this advantage, that it was not a collection of estimates and figures, but of results, and of expenditure. With regard to Italy, through the kindness of the Parliamentary authorities, I obtained a larger amount of Parliamentary information presented on the part of the War Minister to the Committees of Parliament, and from Committees sent back to the Chamber of Deputies than those of any country, not excepting the English Blue Books which have puzzled so many of us. The Italian has a natural genius for analysis; he has a power of diving to the very bottom of a subject, which is perfectly marvellous; and inasmuch as the great question for Italy is for the present her army, the government has gone deep in research into military subjects; they have accumulated every historical fact that can bear upon the question, and have thrown light on a great many points of which we were ignorant. For instance, is any student of German history acquainted with the principle, on which the great Frederick paid his officers? He sought them far and wide in whatever country, and for their speciality; he employed and paid them highly, and this is exceedingly remarkable,—he seems to have made separate payments to the individual, and in cases of artillery and cavalry officers he gave pay in those days to the troop officer in those arms equivalent to the double pay of a captain in the British service in India at the present moment. A remark has been made as regards the proportion of revenue expended on the army, varying from 13 per cent. in Italy to 20 per cent. in Germany. In these cases I think the revenue should be set against expenditure generally and subdivided afterwards, attributing so much to the different arms, so much to fortification, so much to office expenses, and so on. I have tables on these matters in my hand, and they are quite at the command of the lecturer in case of discrepancy.

Now with regard to the conscription itself. An army is a constitutional necessity in Italy, because Italy says thus:—"We will have no invasion on our frontiers; we will invade none; we will be drawn into no entangling alliances. Italy for the Italians! The Army made Italy; the Army will make the Italians." The Army has thus become a necessity, and the most permanent arrangements have been made for the purpose of giving Italy an Army such as she desires. And here is the fair side of conscription. When I discussed conscription with the highest military officer in the country and those nearest the throne, the remark made was, "A conscription is possible for us, but it would be unfair for you, because with your Indian and Colonial service you could not send a conscript out of the country. That shows the principle on which conscription is understood in Italy. The country is divided into districts so that the soldier is as it were amongst his fellow-provincials, and is not harshly thrust amongst those with whom he may have no affinities; but the regiments are kept separate in the districts, and when the soldier is once placed in the regiment he is sent to any part that may be necessary. The soldier is taken as a youth, and this is the difference between the conscription of this Italian country and others, that he is taken as a youth, he is worked as a youth, he is sent back immediately his work is over to his parish (I am speaking of the infantry soldier), and is not then drawn upon for the period during which he is liable to conscription, unless in case of war. What is that period? Twelve years, during which he is liable to conscription, and three years, or, practically, two years and eight months, during which he is with the colours, and he is then returned to his own home. Being taken as a very young soldier indeed, he goes into the condition of my militiaman of whom I spoke, who has not obtained a position in trade or business, from which being displaced, he encounters a serious loss. A scale has been made for the force that can be calculated upon from 1855 to 1885. I take three decennial periods, and I find 90,000 men; 65,000 immatures to repair the loss, 25,000 are sent home and drawn upon during the three

which is rather under 10 per cent. ; consequently, at the end of three years the 90,000 are exhausted, and this is the result :—in 1872, 381,300 with the colours, and 250,960 at home, and in 1884, 576,000 with the colours and 191,000 at home, making 767,000, which is to be the normal state of the future available army of Italy, and which may be mobilized in a fortnight.

Colonel ROBERTSON, late 8th King's Regt. : I never heard read in this Hall, I have never saw reported in the Journal of this Institution a more able and instructive paper than that which we have just had the pleasure of hearing Captain Ardagh read to us. The facts he has collected are most valuable ; I may say they are indispensable for any one who wishes to investigate thoroughly the problems of military organization. Very few Officers wishing to obtain such information as is contained in Captain Ardagh's paper, would know where to find it, still fewer, if they knew where to search for it, would have the perseverance and the analytical skill to extract from voluminous official documents, the data required for such exhaustive summaries of results as Captain Ardagh has not only tabulated for us, but which he has also commented upon with a masterly clearness of statement which could not be surpassed. For in the long paper with which he has favoured us, I do not think there is a single ambiguous sentence which requires explanation, or a single obscurely stated fact, respecting the significance of which, any gentleman present will feel it necessary to ask a question.

As regards the conclusions of Captain Ardagh, I regret very much to find that an Officer whose opinions are certain to be regarded as authoritative, is an opponent of the policy of exacting military training, and the liability to military service as a duty.

I entirely differ from Captain Ardagh, and from all those who think that compulsory military training would be hurtful either to the private interests of the individual citizens of this country, or to the political and industrial interests of the state. I say compulsory military training, not compulsory service, because the effect on individual and political interest of exacting the performance of military duties for a short period is totally different from the effect of exacting this duty for a long period. I regard military duty exacted for a short period (say one year) as a highly beneficial educational training, but if exacted for a long period (say five or even three years), I regard it as a most onerous and pernicious servitude.¹ In considering the question,—is, or is not compulsory military service beneficial? the answer altogether depends on the length of the period for which the recruit is required to serve. If for a short period, it will be beneficial, if for a long period it will be injurious both to the interests of the recruit and of the State. Conscription, that is military servitude for a long term of years, may, perhaps, without much exaggeration with reference to individual interests, be described, as it is described, in the words of the late Mr. Godley, quoted by Captain Ardagh,—“A tax by lot, which takes from the “conscript at one fell swoop his whole capital, *i.e.*, his labour and his time.”

But a short term of compulsory training has a very different effect. A law imposing such a duty so far from diminishing the capital of a labourer would increase it, for, although during the year of training the pay he would receive from the State would be less than the wages he might have earned, I do not consider it correct to describe this difference between the recruit's pay and the labourer's earnings as a pecuniary loss and an unjust tax imposed on the recruit. On the contrary, I look upon the sum representing this difference as capital very profitably invested, as money laid out in an educational training, the equivalent and much more than the equivalent of which will be increased vigour both of body and

¹ I regret that Captain Ardagh did not include in his paper some statistics respecting the military organization of Switzerland. Should the Government of that country ever consider it expedient or necessary to render compulsory the performance of some part of the military duties required for national defence, I am inclined to think that some modification of the military institutions of Switzerland would be found better suited to the social and political condition of England, and therefore better adapted to serve as our model, than the military institutions of Germany, France, or Italy.—A. C. R.

mind, increase of money-earning power, increased chances of obtaining profitable employment.

This view of the effect of a short term of military service is in accordance with the views of General Trechu,¹ and of Sir Charles Trevelyan.

Sir Charles considers that to a young labourer military training is as great, even a greater advantage than university training to a young man intended for a professional or political career. If this be so then, that statesmen who shall pass a law exacting from every Englishman the duty of one year's military training, so far from imposing an unjust tax or an intolerable burden on the people, will confer on every labouring man in England a most valuable boon, a benefit of very real and practical kind. Time will not permit me to say more respecting the manner in which a law rendering military training compulsory would affect the social and individual interests of the community, but I shall endeavour to indicate in a very few words what I think would be the effect of such a law on the political interests of the State.

During long periods of peace, influences are at work which give an undue predominance to the special selfish interests of individuals, and which are often adverse to the general interests of the community.

These influences have a disintegrating effect on that combination of political forces, which constitutes a vigorous national life. They are inimical to all institutions and organisations requiring the sacrifice of private interests for the public good; and having for their object to render the individual will and all the abilities of every citizen subservient to the purposes of the State, and instrumental in carrying out its policy. As an extreme and almost ludicrous instance of the sacrifice of the interests of the public (or at least what the Government believe to be the interests of the public) to the selfish interests of a few individuals, I may mention the successful resistance of the insignificant section of the community engaged in the manufacture of lucifer matches to the financial schemes of a minister remarkable for the determination of his character, and belonging to a Government which commanded a large Parliamentary majority and the confidence and support of a powerful party in the State. Another striking instance of great political power, entirely under the control of individual interests, is afforded by the very effective, though not entirely successful, resistance of the publicans and brewers to the recent legislation for regulating the liquor traffic. The political effect of a measure rendering military service compulsory would be antagonistic to the predominance of selfish feelings and interests as motives of action, and to those tendencies of the existing condition of political forces in England, which are opposed to national organisation, to the centralisation of the powers of Government, and in general to the attainment of all objects which require unity of purpose and combined action.

I have to apologise for the length of these observations, but I trust they will not be considered as either superfluous or irrelevant. The considerations I have endeavoured to present have not been discussed by Captain Ardagh; perhaps the scope of his paper did not require him to notice them. It might, however, have been expected that either the author of the admirable essay on "recruiting," to which the prize medal of the Institution was awarded, or else some of the Officers who took part in the discussion which followed, would have pointed out that the institution of a system of compulsory military training would be attended with great social and political, as well as with very great military advantages. As, however, this was not done either by Captain Hime or by any of the speakers, whose observations are reported in the Journal of this Institution, I have availed myself of this opportunity to endeavour to direct attention to those considerations, which, if ably advocated and thoroughly discussed, will, I feel convinced, lead to the conclusion, not merely that we must be prepared to accept as an inevitable military necessity, a measure rendering compulsory a universal training to arms; but much more than this, that we should recommend and endeavour to promote by every means in our power its voluntary adoption, because we confidently believe that with

¹ *Vide* the chapter headed "Jeunes et Vieux Soldats" in *l'Armée Française en 1867*.

reference to the civil and political, as well as to the military interests of the nation, such a measure is in all respects expedient and very desirable to establish this conclusion, and if possible to render it popularly acceptable. This is a task which I hope will be undertaken by some member of this Institution who has more authority to command attention, and more ability to convince and persuade than I have. Captain Hime is reported to have said, "I am not in favour of conscription, I only point out that whether we like it or not, it is inevitable." I am by no means sure that conscription is inevitable, but I am quite sure that conscription, if adopted, whether from necessity or from choice, will certainly be very beneficial; that if once established among us, it will be cherished as one of the most valuable of our national institutions.

Captain FEATHERSTONHAUGH, R.E.: I only wish to say two words. There appeared to me to be an inconsistency in Captain Ardagh's argument. He says, "If you have voluntary enlistment you have to pay the market price; if you have compulsory enlistment you do not actually pay to the man, but the State loses it" in another way, so that it is six of one and half a dozen of the other." I do not see that the argument has any weight. I do not agree with the second conclusion that the State has to pay that difference between the market value and the wages of the soldier indirectly. It is often said there is nothing so fallacious as figures. I believe that is true. The real question is, can the State afford to have 100,000 men idle every year? and if you look at it in that point of view I think it can. The labour market is over-stocked; men are emigrating; if there were 100,000 soldiers idle every year besides those who go abroad, wages would only rise slightly, and I consider a thickly populated country like England can afford to have a number of men idle every year. I shall be glad to hear any more explanation of Captain Ardagh's theory, because it is to me a stumbling-block I cannot get over.

Mr. RALPH KNOX, War Office: I do not wish to enter upon a discussion as to whether conscription is the best course for this country to adopt, but rather to congratulate the lecturer upon the delivery of this most important and interesting lecture. I do not think he has really raised the question as to whether conscription is advisable or not. He has wished to inform this Institution, and through this Institution the public, for which I feel certain that this Institution and the public will feel very grateful, what he has found after most elaborate inquiry and study, to be the relative cost in money of the soldier in the various countries of Europe, and what he considers to be in money the cost of conscription to the individuals who are conscribed. I think he has stated with remarkable clearness in his lecture, and with even more clearness in the Tables attached to it, the facts as to these matters, and I can only say that I thank him very much for the information which he has prepared. The department to which he belongs may congratulate itself as bringing forth this very excellent fruit as one of the results of its institution. The lecturer has been enabled from the position which he holds, to analyse many facts and figures, which, until very recent years, were hardly accessible to one individual; he has studied them thoroughly and has laid them most clearly before us. He has, in the course of his lecture, criticised in a very small degree, and therefore I am not inclined to join issue with him, the way in which some statements are made in the statistics which are laid before the House of Commons in this country. But I may say in explanation, that these departments are not able to do as they like in laying figures before Parliament; there are rules that guide them, rules that restrict them, which they in many cases would be willing to cut through. This is not possible, as the rules in many cases are of great value to secure the objects in view. The figures in the estimates state in the most clear and accurate manner all that can be stated as a forecast of the expenditure to be incurred for the Army in this country. It is quite true other nations go into more elaborate details in their figures, but those figures are by no means exact. What we do want, however, in this country is a clear and exact return of past facts. We want clear and exact statements as to what has been done with our money. We do not seem to take an interest in these things, but such statements are really at the root of all true economy. Very few people know it but nevertheless it is the fact, and if more care were taken in laying the monetary facts of the past before the country, I am sure it would tend to vast saving of military expenditure. I do not wish to occupy your time any further, but

conclude by thanking Captain Ardagh very much indeed for the very elaborate and clear statement of the cost of the armies of Europe which he has laid before us.

General Sir WILLIAM CODRINGTON, G.C.B. : Every nation has its own characteristics, and one of the characteristics of the English nation is a desire for the absence of compulsion. With regard to conscription, it is my impression that it is the most expensive, the most tyrannical proceeding with regard to families and to individuals, that can be adopted by any nation. Look at the extreme detail of supervision that goes on—I do not know whether in France it is to the same extent—but which is enforced in Prussia; not only is the individual taken, but I think I am right in my impression, that the family is made answerable for the man being forthcoming in his village when he is wanted. I ask you to carry that into the detail of English life and judge what it would include. There is another consequence in Prussia which shows the extent to which it is necessary to go in this extreme of compulsion, viz., that if a man is lame and not fit for service, they make him pay in money as they naturally say "It is not the fault of the State that you are lame, we cannot admit that you should be freed from the necessities of conscription except by paying." That is another result of rigorous conscription. My general impression certainly is, that unless you are under the pressure of invasion, or of such an attack elsewhere that your last defence would be by fighting abroad, you will never get conscription in England; I believe it would be better worth while paying to the utmost, than it would be to take every individual of every class to do that, for which I believe you will get men better suited to your purpose by volunteering. With regard to a proposal for conscription in England, it was said by a Secretary of State for War, "that the Government preferred paying for the labour they required." If we really did so pay for the labour we required, we certainly should get the men. It might be a very costly business, but I believe in the end it would be more economical to the nation generally than that extreme compulsion which would be necessary for conscription.

E. B. DE FONBLANQUE, Esq. : I entirely agree with the last speaker, that the English instinct is so completely against conscription that it would be almost impossible to introduce it in this country. The tendency of the Essay has been to establish that, upon financial as well as upon political grounds; but I think Captain Ardagh has rather lost sight of the differences in the institutions of other States, owing to which the system which is not admissible by us, is perfectly admissible in other countries.

Captain ARDAGH : I only spoke of England as regards conscription; I offered no opinion whatever about conscription in other countries.

Mr. DE FONBLANQUE : You gave illustrations on the subject.

The CHAIRMAN : Illustrations as to cost—as to the working of it.

Mr. DE FONBLANQUE : Well, as to the working of it. The lecturer spoke of the exemptions under the law of prescription as being very unfair. Now, in some countries these exemptions are next to nothing. In Switzerland, for instance, there are hardly any exemptions whatever. Then, by way of contrasting the advantages of voluntary enlistment with conscription, he has quoted the civil war in America, and has alluded to the patriotic feelings that induced them to come forward, until almost the whole population may be said to have been absorbed into the Army. But the fact is, nearly one-half of those Armies consisted of foreigners, principally of Germans. (Captain ARDAGH : No, no.) Probably I exaggerate when I say one-half, but I do not think I am very far wrong. As I said before, however, I entirely agree with the lecturer, so far as the question is confined to England, and as to conscription not being capable of defence on financial grounds, which the lecturer has fully and ably established.

Captain GURDON, R.N. : I just wish to speak a few words to confirm the last speaker. Fully one-third of the men in the Northern Army were foreigners—either Germans or Irish, and if the Southern States had been able to have blockaded the North, the North would not have been able to have kept up the war the length of time they did. One whole division of General Sherman's Army were Germans, and so far Germans that they could not even speak one word of English. About one-third of the Army of the Potomac were Irish and Germans. I beg to state, I have

got my information in the United States itself, where I was travelling and residing for two years and a-half; and I got my information, not only from Southerners, but from United States Officers as well.

The CHAIRMAN: Were they naturalised Germans?

Captain GURDON: They were not; they were men who came over during the war. There were special agents from the United States in Germany, and also in Ireland, and these men were ostensibly sent over for railway works, but, in reality, they were all, when they arrived at New York, enlisted, given large bounties, and took the place of Northerners who ought to have served in the Northern Army, but could not be got to serve. I would also beg to state, with reference to Captain Ardagh's statement that the cost of the American Army is so enormous and its pay so large, is perfectly correct, and, notwithstanding that very high pay, it is not possible to find sufficient native-born Americans to enter the ranks; nearly one-half (which you will admit is a very large proportion for the Army of any country) consists of foreigners, German and Irish chiefly, at the present moment.¹ I think that fact will dispose of one of the subsequent speaker's remarks that, if you pay your men very highly you would *always* get them, because in this case the American Government cannot get a sufficient number of their own citizens to serve in the ranks of the Army. That depends, indeed, on what opening there is for the civil population. If the civil population can make a great deal more money by civilian pursuits than they can in the Army, and there are greater openings, of course naturally, in countries like America or England, you cannot get your men. The same thing was apparent here during the Crimean War, when we could not get sufficient recruits, although we were offering high bounties, and we had to raise a German legion, an Italian legion, and a Swiss legion,² and, if the war had gone on two years longer, half our actual Army in the field would have been foreigners. My remarks were caused by Captain Ardagh's statement that, in his opinion, both this country and the United States could rely on voluntary enlistment to sustain the strain of a serious war; I do not think that actual facts tend to confirm that statement.

Captain ARDAGH: I expected to have thrown an apple of discord among the audience in raising this question of conscription, and am very much obliged for the remarks which have been made on the paper, and in particular for the statistics which Lord Waveney has given with regard to the Italian Army. But I must say, with reference to his remarks, that he drew his statistics from a prospective table, whereas I took mine from actual facts and returns, which the Italian Government gave. There is really no material difference. As regards exemption on educational grounds in Italy, the principle on which it is carried out is very little different from that which is enforced in Germany; the test is somewhat more severe than in France, but the principle is much the same in all. Colonel Robertson has called attention to the advantage of military training as compared with an university education, for which, he suggests (it may be considered) a fair equivalent.

Colonel ROBERTSON: It was Sir Charles Trevelyan's opinion.

Captain ARDAGH: I think Sir Charles Trevelyan has rather over-estimated the advantage of a year's training in the ranks.

Colonel ROBERTSON: I quite agree with him, but I quoted him.

Captain ARDAGH: One might set-off against that advantage, supposing it is an advantage, the great loss which persons who earn large sums in private employment would be subjected to in being withdrawn from their occupation for a year: and I really think if you appeal to the country, that any notions entertained as regards the advantage which the youth of the nation might derive from compulsory military training would never meet with the slightest response from the great bulk of the population, and it is quite useless to propose such a thing. The objections that Captain Featherstonehaugh has raised with regard to conscription have been virtually

¹ This is excluding the negro troops, my observations only applying to whites throughout. There were about 60,000 negroes during the war in the Northern Army; at the present moment, I believe, there are about 4,000 in the United States Army.

² Not to mention the Turkish contingent.

answered in the paper. I do not allege conscription is not cheap; if you judge by the annual Estimates, it is cheap according to this standard. You have in France 20 millions as the nominal cost of the army, but I have shown you it costs that country at least 26 millions, and I believe it costs over 30 millions. It is unreasonable to say that because they only pay 20 millions for what costs the country 30 millions, they are gainers thereby. I am deeply obliged for the compliment which Mr. Knox has paid to these statistics. No one is better able to offer an opinion on that subject than he is; but I must beg him to consider that in criticising the form in which the British Army Estimates are presented to the country, I only intended to impugn them in so far as that they make it impossible for any one to discover, except by the most minute investigation, what a soldier really does cost; and if I were to ask Mr. Knox now what would be the cost of adding a new division to the British Army, I venture to say he would find it almost impossible to procure data to answer the question. Sir William Codrington, I am glad to hear, adds the weight of his authority in opposing conscription. As regards Mr. De Fonblanque's observation with reference to service in Switzerland, I venture to submit that it can hardly be brought in as an example. Military service in Switzerland is merely an amusement: the great bulk of people who go out for their short annual training in Switzerland regard it much in the light of a picnic. There is hardly such a thing as military law in Switzerland; they are subject to but slight restraints and no hardships. With regard to America, it has been asserted that one-third of the whole armies in America were not naturalised American citizens. From the returns that are published, it appears that one-ninth of the population of America were under arms during that war, and I ask you if it is possible that one-third of that one-ninth could have been foreigners? It is simply preposterous; the thing is disposed of by the mere fact that one-ninth of the whole population were under arms. To tell me that 3,700,000 men were one-third composed of foreigners in America during the war is to make an assertion that won't bear any inquiry at all.¹

In conclusion, I beg to thank the meeting for the interest with which this comparatively dry subject has been received.

The CHAIRMAN: Gentlemen, I think you will all agree with me that we are greatly indebted to Captain Ardagh for this most valuable contribution to the records of this Institution. It is by papers such as these that the character of the Institution stands, and will rise. Before sitting down, I would venture to make a few observations, as the subject of the paper is one which, as Captain Ardagh has said, I have studied a great deal, and it is one also concerning which I have before spoken in this room. I quite agree with Sir William Codrington, that you must take into consideration, in debating this question, the circumstances of the country to which it refers. What is a necessity—an absolute necessity—on the Continent, is happily for us not a necessity. Foreign Governments have to deal with the the necessity which has been imposed upon them, and they deal with it according to their respective lights, and in that way in which they consider it will be least onerous upon the populations they govern. The latest law, at any rate, the last that has come to my knowledge, with regard to conscription, is the new law of service in Russia. It is based on the same principles as the German law—that all the population, including now the nobles who were formerly exempt, are liable to

¹ The annual number of able-bodied male emigrants (about one-fifth of the entire number) was, during the period 1860-70, 90,000. If every available man of these had been drafted into the army on landing in the country, the four years of the war could, as a maximum, have only produced 360,000, or one-tenth of the number mentioned, instead of one-third as alleged. The estimated number of naturalised citizens residing in the United States is 4,136,000, of whom 3,100,000 are Irish or Germans, the total population being 38,558,371. The number of able-bodied men would amount to about one-eighth of the whole, or 500,000, so that both sources of supply would fail to make up one-third of the whole. As a matter of fact, the largest proportion of recruits was furnished by the Western States, which had no means of procuring immigrants as substitutes. Kansas sent 36 per cent. of her men to the field, Iowa 30 per cent., Indiana and Illinois over 25 per cent. The Confederate States had, of course, no means of recruiting by immigration, in consequence of the blockade.

military service, and therefore to conscription. The Emperor, in the *Edict* in which he publishes this law to the country, congratulates himself and the country on the readiness with which those classes who were previously exempt from conscription have fallen into his views, and accepted this law; but when you come to look into the operation of the law, you find exemptions of the most marvellous character; all people who have properties to manage are exempted; all people who are in the Government service, and not only those in Government service, but those even who are in the service of any corporation are exempt, and have their names registered as such. In fact, the exemptions are countless; and as if they were not sufficient to accommodate the favoured classes, there is a clause under which the military authorities may give to every man who has not acquired the honourable position of a non-commissioned Officer a furlough, or, in other words, may place him at once in the Reserve, which is tantamount to exemption. Having lived in Russia for some years, I conceive the practical working of this law will not tend to promote high morality in the country. With regard to conscription, notwithstanding the many objections attending it, one cannot help admitting it has some great advantages. Germany has reaped the benefit of those advantages to the full extent, because it has been in operation for many years: and amongst them, perhaps, the greatest benefit that has accrued to Germany is that of having promoted education. I have myself seen on the frontier, as you cross from the German provinces into the Russian, the most marked difference between the state of the people on different sides of the conventional line which divides these provinces, for in many places it is merely a line, and not a river nor a geographical boundary; on one side you will find people in the grossest ignorance, and on the other side they have already arrived at a fairly high state of education; you see it in the better cultivation of farms, and in the manufactures which are to be found along the frontier. I have heard intelligent people in that country attribute this difference to the effects of conscription; the population—labourers, artisans, and poor farmers, and that class of people—know, on being drawn into the Army, that they have to come back to cultivate their farms, and earn their livelihoods in their own country, after their three years' service in the ranks. They therefore use their wits, and, acquiring enlightened ideas among a much more civilized people than themselves, bring the knowledge they have attained in those provinces where they have served, chiefly the Rhine provinces, to their own. And so, I conceive, practical education has been equalized to a very great extent over Germany; that is one advantage gained by conscription, as it has been worked in Germany, and as has been proved by the figures adduced by Captain Ardagh, who stated that 96 per cent. of the population read and write, whereas we stand next on the list of educated people at 90 per cent.

I think we are greatly indebted to Captain Ardagh for a point which he has proved most convincingly in this paper, that the cost of an army to a country is not to be estimated by the pay that is given to the soldier, but by the value of the labour that is lost to the country. This being the case, if your army is 200,000 strong, it matters not whether you give the men a farthing a day, as the Russians do, or a shilling a day, as we do, the cost to the country is the same; it is the labour of 200,000 pairs of hands lost to the productive energies of the country. The 200,000 men may be labourers or artisans, the only difference is, that the higher you go in the social scale, the greater the cost to the country. I think we are greatly indebted to Captain Ardagh for having brought this fact out so strongly and convincingly. But while the cost of conscription is the same to the country, it is very different to the individuals who bear that cost. Instead of conscription being an equal tax—I coincide with every word of that valuable extract from a report by Mr. Godley, which was read by the lecturer—it is, I believe, the most iniquitous tax that can be in its working and in its incidence upon individuals; and although on the Continent it is a necessity, I should be exceedingly sorry to see it introduced into this country. I also think the ballot for the Militia very nearly as objectionable as it would be for the Army. For what is the ballot? It means conscription; it is merely the method of selection by which the conscript is drawn into the Militia. If, as would be necessary if the ballot were to be enforced, the Government of this country were to attempt to pass a law by which the infant

would be watched from the cradle up to manhood, and never lost sight of, there is not a mother in England who would stand it. Then you have the total denial of all liberty to transfer oneself from one place to another, or to travel abroad. For the last year before the age of conscription arrived, you would almost want to place a sentry over every man who had to be conscribed ; that is my belief. Such being the case, I should like to make an observation upon a remark that dropped from Colonel Robertson, and I allude to it because it contains a fallacy which is very common in this country on the part of those who admire compulsory service, who say, " Why " not take a man for a year." Colonel Robertson said, he should like to see all the able-bodied men in England under arms for one year. Of course, that would involve our keeping up a separate standing Army for the Colonies and India. The number of males attaining military age each year upon whom this duty would fall, is 280,000 ; now if you make a liberal deduction, say 30,000, there would remain a standing Army—mind, it would be a standing Army, because they would be so for each year in succession—of 250,000, in addition to our Colonial and Indian Armies.

Colonel ROBERTSON :—I think the lecturer estimated the number actually available at about one-half.

The CHAIRMAN : That is available after exemption as practised on the Continent, but of course if you call men for a year and keep them at home, you will have to get rid of the law of exemption, and I think if you had the power and were to apply the law of exemption in this country, with all our liberal ideas and inconvenient questionings in our Houses of Parliament, you would never be able to carry it into effect. The law of exemption very often degenerates into a means of getting exemption by interest, or possibly some other means, not only most objectionable, but most demoralizing. I think it is a point which some people often lose sight of, that short service for everybody involves a very large standing Army ; and, as the lecturer has shown, 250,000 men, whatever their pay might be, would cause an equal deduction from the productive labour of the country. There is only one other point upon which I wish to make some observation, because I do not quite coincide with the lecturer, and that is his calculations and deductions as to the effect of men being drafted from the Army into the Militia, from which he infers that it would be necessary to reduce our cadres. I do not think that is at all necessary. My idea is that men should be drafted from the regular service into the reserves, and after keeping in those reserves enough men to fill up your service battalions, the balance, as well as those who have served their full time in the reserves, may be drafted into the Militia. The result would be that, instead of having partly and imperfectly trained soldiers in the Militia, you would still have the same number of cadres, but composed of men who had passed through the regular Army and been trained for a certain period, had acquired habits of discipline, and been instructed in their duties.

It only remains for me to ask you to give your thanks to Captain Ardagh for his very valuable and interesting Lecture.

THE NAVAL PRIZE ESSAY, 1876.

ON THE BEST TYPES OF WAR-VESSELS FOR THE BRITISH NAVY,

1STLY. FOR COMBINED ACTION;
2NDLY. FOR SINGLE CRUIZERS OF GREAT SPEED;
3RDLY. FOR COAST DEFENCE.

By Commander GERAARD H. U. NOEL, R.N.,
Prizeman, Junior Naval Professional Association, 1873.

“SEGUITANDO SI GIUNGE.”

INTRODUCTION.

THE difficulty of the subject of this essay is such, that the most scientific men in the country have failed to arrive at any unanimous conclusion as to what are to be the types of the men-of-war of the future.

The individual opinions already collected are most valuable, but the desirable number of such opinions is unlimited, and all opportunities for giving them publicity, such as essays of this kind, are exceedingly useful in opening up the subject.

Designers and shipbuilders, among whom we find many most able and scientific men, have had in the last few years a difficult task to perform in order to satisfy the requirements of the nation and to keep pace with the enormous and rapid changes in the construction of vessels and in the manufacture of machinery.

The building of vessels-of-war is an art, in which perfection cannot be attained without great and varied experience, and consequently without vast financial expenditure.

Hitherto, the construction of ironclads has not been altogether satisfactory. After all the experience of the last fifteen years, during which time ironclad after ironclad has been built, we still find ourselves unable to arrive at a conclusion as to which is the most satisfactory type.

The Committee on Naval Designs of 1871, were in favour of the “Devastation” class, and also advocated vessels of the “Hercules” and “Vanguard” classes, though opinions were divided as to which of these two types should be followed. Many members, no doubt, foresaw that the days of *all* these ships were numbered, but the time was not ripe for the great changes I now advocate.

Reviewing our present Navy, we cannot but feel proud of its great strength, and of its undoubted superiority over that of any nation, or even of any other two nations. Our ships are not only numerous but well-built, powerfully armed, and admirably equipped. But, grand as our fleet is collectively, it is not satisfactory to observe, that of all the types represented therein, few can be truly called the recognised types of the future, and these few are types of minor importance.

Still, little advanced as we are in the construction of ironclads, other nations are far behind us.

The French, who are noted for their skill in shipbuilding, would probably have kept pace with us (under the guidance of such an able man as M. Dislère) but for the Franco-German war. Next to our Navy, theirs is the most numerous, but their new ships are comparatively few.

The Germans are steadily advancing: they have an ironclad fleet in process of construction consisting of eleven ships, viz., two heavy frigates of the "Hercules" type; the "König Wilhelm" (5,900 tons); two smaller vessels of an older type; three turret vessels (4,118 tons); and three corvettes and sloops. We can, however, learn nothing from these types.

The Russians have one turret vessel (9,662 tons) "Peter the Great," built after the plan of the "Devastation;" one large frigate the "Sevastopol;" one moderate-sized frigate, and six small frigates; three corvettes; and ten gunboats; besides these, three floating batteries, two of which, circular in form, I estimate highly, and mention in Part III.

The Turkish ironclad Navy consists of two 9,000-ton frigates, very powerful vessels (with 12-inch armour at the water line, and 10-inch plating elsewhere); four moderate-sized frigates; eight corvettes; and five gun-boats.

In these various Navies, we find some exceedingly powerful ships, most of which are English built; we cannot, therefore, hope to learn as much from the experience of foreign nations as from our own. Englishmen are, and I trust ever will be, pioneers of the science of shipbuilding.

While completing this essay, a catastrophe occurred, which has caused a great controversy on our subject, and has given rise to many opinions as to the necessity for a change in the construction of our ironclads, I allude to the sinking of Her Majesty's ship "Vanguard" by the ram of her sister ship the "Iron Duke."

This accident, while proving the awful power of the ram, strengthens my arguments in this essay, and points to the inexpediency of building such costly vessels, so wanting in floating power as to sink when casually wounded.

PART I.

On Ships required for Combined Action.

For the convenience of discussion, I will divide the sea-going ironclads of the present into *seven classes*, and for this purpose shall

follow the plan suggested in an admirable article on the "British Navy," which appeared in *Blackwood's Magazine*, of March, 1871.

It is an open question whether the ships of the "Devastation" class are to be included under the heading of "ships required for combined action," or under that of "ships required for coast defence;" until more thoroughly tested as to their sea-going qualities, I should prefer giving them a place in a future chapter.

The first class as represented in *Blackwood*, consisted of the "Hercules" and "Sultan." To these will be added, as they are completed, the "Alexandra," "Téméraire," "Nelson," and "Northampton." Undoubtedly these are the most formidable ships-of-the-line now in existence. The "Hercules" and "Sultan" have been thoroughly tested and are found efficient as sea-going ships. They combine fairly protected water-line and battery, heavy guns delivering their fire in all directions, with great speed and handiness, which carries with it a most terrible power of ramming.

The drawback to this class of vessels is their enormous cost; and when we consider that the explosion of one skilfully-directed torpedo would sink the largest of them, and that the thickness of their water-line armour is insufficient to resist a 9-inch chilled shell (thereby exposing their most vital parts to danger), we cannot bring ourselves to believe that the expenditure of over half a million sterling for each vessel, has brought its adequate return. Besides this, the "Sultan" has the defect of excessive top-weight (to counterbalance which, 600 tons of extra ballast have already been put into her): and, indeed, in all these vessels, the fact of protecting their batteries with heavy armour, is, in my opinion, a questionable principle, for by so doing, the size of the battery is curtailed, and the ship is rendered crank; whereas the same weight of armour judiciously placed elsewhere, would make the ship less crank and unsinkable by artillery.

The second class, represented in the above-mentioned article, includes the "Audacious" and her five sister-ships, and the "Monarch," as a sea-going turret ship. The first six of these, though powerful vessels, are generally considered failures. Insufficiently plated at the water-line, overburdened with heavily armoured box-batteries above the upper deck, their first trial proved them so excessively crank as to be wholly unseaworthy. This last evil has been rectified by an increase of about 400 tons of ballast. They are now efficient ships of war, but not of a type likely to be increased in number. The "Monarch," in her peculiar province, is a magnificent vessel. As a ship-of-the-line she is only a few degrees less valuable than the "Hercules," and would be subject to the same objections. But this is not the "peculiar province" referred to. Where she would excel, is in heavy weather, under circumstances where ramming power would be of least advantage, and that of working guns easily in a sea-way, invaluable. The height of her turrets above the water, though a disadvantage in a smooth sea, is an immeasurable gain in a gale of wind—as she is wonderfully steady in a sea-way.

The third class includes but one sea-going ship of deserved repute, the "Bellerophon." She was the first of that type which may be

considered as the most successful, and which is now represented by the larger vessels described as Class I.

The remaining ships of this, and those of the four subsequent classes, are so far out of date that no reference need be made to them in this essay. It may be observed that there is one vessel (on the stocks) to which I have not referred. That vessel is the "Shannon," now being constructed at Pembroke on an entirely new principle.

"The "Shannon" is to be a vessel of 5,000 tons, with a belt of 9-inch armour 9 feet wide at her water-line, extending from the stern to 60 feet from her bow; across the ship at this place a 9-inch armoured bulkhead is constructed, 25 feet wide, reaching above the upper deck. On each side of the ship this extra width of armour extends 26 feet from the bulkhead aft, thus forming a citadel in the fore part of the ship well protected against fire from ahead, and which affords protection to the Officers directing the ship. Above the water-line armour-belt, and aft the bulkhead, a 1½-inch plated deck is constructed. Before the bulkhead, the armoured deck is 5 feet below the water, and slopes down to 10 feet at the stem. I will not say I wholly coincide with the principle on which this ship is built; but it is the only approach to what I deem necessary for ironclads or ships-of-the-line.

We require for "*combined action*" moderately heavy ships-of-the-line, able to hold the sea in any weather and for any length of time, possessing heavy batteries of at least 16 guns, ram-bows, a speed of 14 knots, the most efficient turning-gear, and the water-line thoroughly protected with armour, especially from before the boilers to the stern.

For the leading ships of divisions, it might be advisable to add a protected conning-tower, so that the important duty of conducting, or leading portions of the fleet could be carried on with greater facility. From an offensive point of view the ram is an indispensable arm; and for its full utilization, as well as for defensive purposes, the thorough protection of the motive and directing power of the ship is an imperative necessity.

The *first consideration* for vessels of this class is, that they be thoroughly "*seaworthy*." I do not mean "*seaworthy*" in the ordinary acceptance of the term, but that a man-of-war should be possessed of a reserve of "*floating power*" that would enable her to be still seaworthy in a crippled state, or after rough handling in action. To effect this, excessive top-weight must be avoided; and I am convinced that the only course is, to abolish the armour-plating for the protection of the battery.

To render an armoured man-of-war efficient as a floating body, it is imperative that she be as unsinkable as possible by artillery; and that her engines and steering gear (motive and directing power) be preserved so intact during an engagement, that the power to evade all attacks of ram and torpedo is secured. To attain these objects, an impenetrable system of armour at the water-line is necessary.

To provide against possible injuries by ram or torpedo, the ship must be divided into water-tight compartments, a few of which may be filled without danger of her foundering. Great difficulty is experienced in arranging these water-tight compartments satisfactorily,

owing to the immense space required in the body of the ship (her most vital part), for the engines and boilers.

Fore and aft, as well as athwart-ship bulkheads, should be placed where it is possible, so that a wound caused by a ram or torpedo would only fill a comparatively small space, and the floating power of the ship would, though reduced, be able to keep her from sinking.

In addition, I would suggest that all these ships be built on the cellular system "with double bottoms;" and that if some method were adopted in the construction of the bottom, by which the shock of a torpedo's explosion would be cushioned, an immense advantage would be gained. This might be effected by the outside skin of the ship being covered with layers of india-rubber, or some elastic substance, the outside of which would be covered with a thin iron sheathing so fixed as to give to an increased or sudden pressure. Another help in the floating power of a wounded ship, would be to use cork for filling the double bottom; this would cause the inner skin to be of some support to the outside of all, when under extra pressure; and if the outer skin were pierced, the cork would still supply its full floating power.

The second consideration is the "motive and directing power."

I would make it compulsory that all ships-of-the-line should be capable of attaining a speed of 14 knots on the measured mile; an excess of this I deem unnecessary. But as the speed of a squadron, or of any number of ships manœuvring together must be regulated by that of the slowest ship, nothing could be more detrimental to their evolutionary power than to have a laggard amongst them.

It is to be questioned whether in vessels for this service double-screw propellers are desirable. The advantages of this method of propulsion are more apparent in large coasting vessels requiring small draught. The benefit of two separate sets of engines wherewith to propel the ship is universal; but in a sea-way the double-screws often prove dangerous, for by the sudden immersion of the weather-screw by a heavy roll to windward, a ship is liable to be thrown off into the trough of the sea. It is quite possible that this was an element in the causes which combined to bring about the awful disaster of the loss of H.M.S. "Captain."

As regards the influence of this system on the turning-power of ships, the *pros* and *cons* are fairly balanced in the smaller vessels required for coasting; but in larger ironclads the advantages are reduced.

With a ship-of-the-line turning at the high speed necessary for manœuvring, the fact of stopping or backing one propeller checks her way; a loss not counterbalanced by the slight extra assistance in the movement of turning.

In considering the turning-power of these ships, we must bear in mind that we are dealing, as Jurien de la Gravière so truly says, "with masses of six or seven thousand tons, which cannot come in "contact without mutual destruction." Now in vessels constructed with single propellers, the rudder is the sole instrument for turning, and it can be thoroughly relied upon; but with double engines the

slightest want of exactitude in the change of speed might lead to serious results, and any sudden accident to one engine would, in a squadron, probably entail some fatal catastrophe.

The "Hecate," or one of her sister-ships, when coming from Plymouth to Portsmouth, for the "Shah" review in 1873 (in company with two or three other vessels of her class), was observed to run off in a direction at a great angle with her course. This was afterwards found out to have been caused by some slight error in the management of her engines.

H.M.S. "Captain" also on one occasion, when cruising with the squadron, unexpectedly left her station abeam of the flag-ship and charged through the fleet, narrowly escaping a collision with the Admiral, which would probably have been attended with fatal results.

Against these objections must be set two reasons, which strongly weigh in favour of double screws. One is, that there being no screw-aperture the rudder-head can be made to enter the ship below the water-line, thus admitting of the steering gear being worked out of the reach of shot. The second is, that a greater speed than that estimated has been got out of well-immersed double screws, the "Devastation" attaining one and half knots more than was expected of her. My personal opinion is in favour of single propellers, but these two advantages go a long way to shake my prejudice against double screws. Some trials have been lately made in the gunboat "Bruiser" of a casing round the screw, which proves a useful protection for fixed single propellers. It not only reduces the vibration, but prevents the screw from being so easily fouled; and at the same time has no detrimental effect on the speed of the ship.

All ironclads of this type should be full rigged ships, and should be capable of using sail under ordinary circumstances. In war-time all upper spars and spare gear should be landed.

I must now refer to the turning and directing power of ships-of-the-line.

It appears to me that for ships with single screws, the balance-rudder of Her Majesty's ship "Sultan," fulfils nearly all the requirements so far as power is concerned, and that in this ship (owing to her drawing several inches more water than was originally intended), the rudder is fairly protected. This is not the case in most of our ships, for not only is the armour round the stern at the water-line inadequate protection, but in many cases the upper part of the rudder is actually visible in smooth water. This is a great weakness, as the importance of the rudder is such, that its destruction in an engagement would entail the destruction of the ship.

It is my impression that if it is practicable to place both the rudder, and the steering gear to be used in action, entirely below water, the safety of the ship would be doubly secured.

I would suggest that it is possible, in ships with single screws, to support the upper part of a rudder by means of a horizontal iron strap secured to the ship's counter, and passing round the aperture of the screw (leaving room for its revolving), and that the whole of this

Plate 1

Fig 1

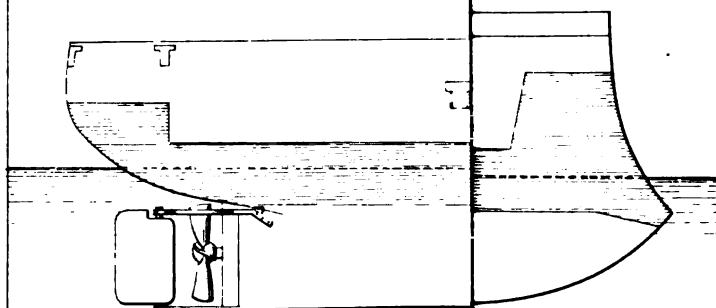


Fig 2

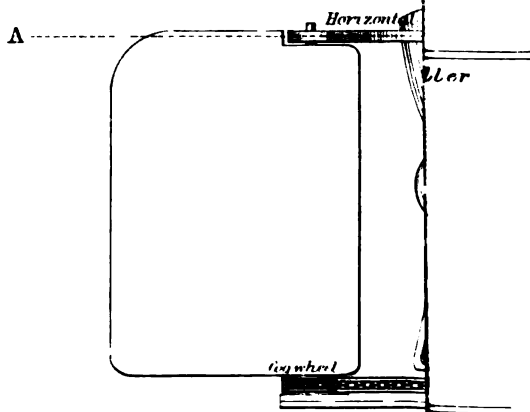
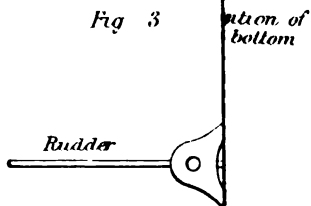


Fig 3



feet to an Inch

structure might be at least six feet below water. Then comes the difficulty of steering gear. I cannot see why the rudder should not be moved from its lower end with perfect ease and with the utmost security. Imagine a cog wheel at the lower extremity of the rudder, just above its pivot, and an endless chain round that, and round another cog-wheel of the same dimensions: this latter cog-wheel would form the lower end of a perpendicular spindle passing up into the ship 20 or 30 feet before the body-post. I have endeavoured to show this in Plate I, figs. 2 and 3. For ships propelled by double screws, the protection of the rudder is much more easily arranged. Nothing could be more perfect than the construction of the rudder and steering gear of Her Majesty's ship "Inflexible." The rudder-head enters the ship about 10 feet below the water-line, and the yoke and steering gear are worked entirely below the protection of an armoured deck. I would suggest this system for all vessels propelled by double screws.

The third consideration is the "armament." The ram-bow is an arm which influences the whole method of building the ship to a very great extent. Numerous as are the ships with ram-bows, it is astonishing how they differ in shape. I have no doubt that the next naval action will prove which is the most formidable. It appears to me that the ram of the "Minotaur" class is too round (or there would probably have been a fatal accident in Belfast Lough, when she touched the "Bellerophon,") whereas the rams of the "Bellerophon," and "Lord Clyde," also those of the "Devastation" class, (although these latter are well supported by the additional beam of the ship, and consequent thickness of their root) are too long, and are liable to be strained or even broken, in striking a heavy vessel that is crossing their bow at any speed. I would, therefore, content myself with the formidable and beautiful curves now seen in the bows of the newer ships, and first adopted in the building of Her Majesty's ship "Hercules."

The new idea being carried out in the bows of the "Shannon," and of the "Inflexible," of having a movable snout supported on each side by a fore-and-aft web, I cannot think will answer; such extreme sharpness is not required, and a comparatively slight pressure on one side would break the movable part off. It is true the bow is still left intact, though were the ship to ram again, she would greatly damage herself and do comparatively little harm to the enemy.

To many, no doubt, it may appear that I attach too little importance to the value of guns. My opinion of the present ironclads is, that they are so built that they cannot be sufficiently armed; and, indeed, many of our other vessels might carry a greater weight of armour than they do at present. I would have vessels constructed on the principle alluded to, of "*unarmoured batteries*," to carry half as many guns again (of the same calibre), as ships of their own displacement carry now. This would combine a powerful though unprotected battery, with a perfectly sea-worthy vessel possessed of great speed and turning power, thoroughly efficient under the most aggravated circumstances. The idea of plating the whole of the upper works has long

been abandoned as impracticable, and in the latter ships a confined place in the centre has been moderately armoured for the protection of a battery of guns. By dispensing with this battery armour, the size of the ship is the only limit of the place for guns. This is an undoubted advantage; and when we consider that the whole weight of the battery of Her Majesty's ship "Hercules," including the allowance of ammunition and projectiles, &c., does not exceed 640 tons, about $\frac{1}{13}$ of her displacement, I am sure that the feasibility of increasing the weight to 1,000 tons would be entertained, if the space was not limited, and the armour of the battery could be dispensed with. My plan then is to increase the armament and thus make it of more importance, arming vessels of 5,000 tons displacement with ten 9-inch 12-ton guns, and seven 8-inch 9-ton guns, or a total weight, with ammunition, of about 600 tons of armament; and arming vessels of 7,500 tons with ten 10-inch 18-ton guns and seven 9-inch 12-ton guns, making the total weight of armament about 880 tons. This last armament would be the heaviest carried by any sea-going iron-clads.

In these ships *all* the heavier, and four of the lighter, would be broadside guns, two of the lighter would protect the bow and also fight on the beam when necessary, and the remaining one would defend the stern.

The manner of placing the guns is arranged no doubt with a view to their use in action, under the probable system of attack to be adopted: it is my impression that too great a value was attached by some of the authorities, two or three years ago, to bow-fire; and that the manœuvring of a fleet in action, will be more for the purpose of using the ram effectually, and the guns in broadsides on passing the enemy. The battery will thus have the greatest opportunity of being effective in a general action. This is explained in a chapter on guns, in a Prize Essay written on naval tactics in 1873. Such was the high estimate entertained of bow-fire that in several of our ships the bow-armament has been made heavier. The Italians have gone to the length of reversing the order of things, in the "Palestro," (their last ironclad), and instead of a centre, they have a bow- and stern-armoured battery, the centre of the ship remaining unarmoured. I believe this will prove a mistaken or false principle.

In dividing the guns along the whole length of the deck (besides giving more room for working), there would be the additional advantage of decreasing the evil of the moral effect produced by the bursting of a heavy shell in the battery; which if in a confined space would not only be more fatal, but would possibly create a panic, and certainly great confusion; besides placing the whole of the guns *hors-de-combat*.

Ships of 5,000 tons armed in this manner, whose probable length would be 270 feet, would have the guns placed as follows:—On each broadside, seven guns; the after gun being 68 feet from the stern, the remainder 22 feet apart, so that the foremost gun would be 200 feet from the stern and 70 from the bow. Of these guns the five after ones would be of the heavier nature. Bow-guns would be on

the deck above, working in an embrasure-port, one on each side about 30 feet from the stem; this port admitting of their firing direct ahead, and about 10 degrees abaft the beam, and being so placed as not to weaken the resisting power of the bow, to the enemy's fire from ahead.

The fourth consideration is the system of armour. The public usually entertain most erroneous ideas of what the armour of an ironclad really consists, and the truth is so difficult to obtain, that even the officers serving on board our ships find the greatest difficulty in making themselves acquainted with the exact position of the different thicknesses of armour. The fact of Her Majesty's ship "Hercules" carrying a few hundred square feet of 9-inch plating, is often construed into her being covered with armour of that thickness. It is not to be wondered at that under the belief that her battery is efficiently protected, we find so many advocates for the "Hercules" class, and such opposition to the system of unarmoured batteries. The article referred to in *Blackwood's Magazine*, March, 1871, speaking of the armouring of another class says, "The 'Audacious,' when broad-side on, presents an area of 6,670 superficial feet, of these only 3,277, or less than half, are plated at all. There is a patch of 100 feet by 3, at the water-line, of 8-inch armour, which tapers down to 4½ inches at the bow and stern, and the rest of the ship has nowhere any thicker armour than 6 inches; the ends of the main-deck battery having only 4 inch, and 5 inch armour, while the ends of the upper-deck battery are unprotected against a raking fire, and more than half the ship's side is in the same unprotected state."

This shows how slightly protected an ironclad really is.

I maintain that by arming a battery you not only limit it in size, but you give the ship too much top-weight, and, after all, it is not possible to render it proof against any of the heavier descriptions of guns. I would, therefore, in our sea-going ships, give up the idea of protecting anything but the water-line (and perhaps in the larger ships a conning-tower), with armour.

A vessel of 5,000 tons would be able to carry 440 tons of armour, or a belt 10 feet wide,—4 feet above the water-line, and 6 feet below it,—of from 10 inches thickness at the immediate water-line, to 8 inches above and below, and backed with wood. Besides this, an arrangement of coal bunkers (only to be opened from above, except when the coal was actually required for use), which would be an additional support to the backing, sufficient to cushion and prevent the further penetration of a projectile which may have already pierced the plating. I endeavour to explain this in an accompanying diagram, plate I, fig. 4. The water-line armour I propose to reduce from its full thickness at 100 feet from the bow, to half its full thickness at the bow. This would admit of the bow being further protected by light armour as high as the upper deck, 15 feet from the stem on each side. The stern-armour I would raise 6 or 8 feet, and would reduce the thickness of that at the water-line under the counter by 12 inches.

Ships of 7,500 tons would carry an armour-belt on the same principle; but the iron plating at the water-line would consist of two

been abandoned as impracticable, and in the latter ships a confined place in the centre has been moderately armoured for the protection of a battery of guns. By dispensing with this battery armour, the size of the ship is the only limit of the place for guns. This is an undoubted advantage; and when we consider that the whole weight of the battery of Her Majesty's ship "Hercules," including the allowance of ammunition and projectiles, &c., does not exceed 640 tons, about $\frac{1}{13}$ of her displacement, I am sure that the feasibility of increasing the weight to 1,000 tons would be entertained, if the space was not limited, and the armour of the battery could be dispensed with. My plan then is to increase the armament and thus make it of more importance, arming vessels of 5,000 tons displacement with ten 9-inch 12-ton guns, and seven 8-inch 9-ton guns, or a total weight, with ammunition, of about 600 tons of armament; and arming vessels of 7,500 tons with ten 10-inch 18-ton guns and seven 9-inch 12-ton guns, making the total weight of armament about 880 tons. This last armament would be the heaviest carried by any sea-going iron-clads.

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(though personally I prefer a single engine, further with double engines may prove their superiority); and the masts and rudder of the greatest efficiency, both being placed within reach of the enemy's guns.

That the ship have a ram-bow resembling that of Her Majesty's "Hercules," and carry a battery of 17 heavy guns, 14 of which be broadside guns, the remainder for bow and stern defence.

That a system of armour 10 feet wide surround the ship at the water-line, sufficient to protect her from the fire of heavy artillery; that the bow be lightly armoured as high as the upper deck, and the stern to a height of about 10 feet above water.

I would suggest two classes of line-of-battle ships of this type. The *first class* to consist of about ten vessels of 7,500 tons, with armoured conning-towers; these ships would be used as leaders of divisions, sub-divisions, or groups. The *second class* to consist of about twenty vessels of 5,000 tons, ordinary ships of the line. I have named 14 knots as the full speed, because I consider a reserve of 4 knots necessary for a fleet of heavy ironclad rams when manœuvring at 10 knots, and this is the highest speed that human power is capable of directing safely under such circumstances.

Before concluding this part of the subject, I must make a few remarks on the steam launches I should like the larger vessels to be supplied with, if the fleet is to be employed for blockading purposes. Each large ship should carry a boat, built of steel, 50 feet in length, of the greatest possible speed, fitted with torpedoes that work either on bow or beam, the place for working which, and the boat, being protected with mantlets of steel. These boats would be found invaluable for reconnoitring the enemy's coast, for destroying their torpedo defences, and for spying the movements of their fleet. At the same time, their own great speed would be a protection against surprise, and their torpedo-armament, if so arranged as to be worked at full speed when passing a vessel, would render them most formidable.

PART II.

On Single Cruizers, of great speed.

This second part of the Essay presents a wide and varied field for the consideration of our ship-builders. The individual construction of cruizers is not so important a question as that of the individual construction of ships-of-the-line; but the vast number necessary for the protection of our colonies, and of our enormous maritime commerce, gives these ships, as a portion of our naval power, a value equivalent to that of the ironclad fleet.

Our present fleet of cruizers is equal, both in number and quality, to the duties required of it. Many of the older ships are doubtless of insufficient speed, and, in case of war, could not be employed where they would meet with the enemy's swifter vessels. But of late years there has been a revolution in the build of cruizers. Iron has to a great extent been substituted for wood; and, in order to admit of

layers, which together would make a thickness of 14 inches at the immediate water-line, and 12 inches above and below, the whole belt being 10 feet wide and 700 tons in weight; in fact, constructed on the same principle as the 5,000-ton ships just described.

The fifth consideration is the cost.

This, though the last, is not by any means the least in many ways. It does not become a nation rolling in wealth to quibble over the sum to be expended on the protection of that wealth. But in this, as in all other outlays, the country looks to receive the value of its money. A certain sum is yearly voted to furnish England with an efficient Navy, and if this is not wisely expended, the country becomes dissatisfied. But, should it at any time be necessary, that sum, great as it is, would be doubled. What we want, then, is not to lavish, but to be prudent in our expenditure, and to use such foresight in building our ships as will ensure our always holding the proud position of "*Queen of the Seas*."

The cost of our present sea-going ironclads is so vast, that of necessity it greatly limits their number. By a reduction in their size and in the complications of their build, we should soon find ourselves possessed of a considerably larger number of really efficient ships for the same sum now expended on a few monsters!

In the question of guns *versus* armour, as heavier artillery was constructed, so larger ships were built, in order that they might carry a greater weight and thickness of armour. Now that it has been universally decided that the guns have won in the competition, and that no sea-going ship can be made proof against the later artillery, it is time to think how the maximum of efficiency in other respects, as well as in the protection against guns, may be attained. Dispensing with part of the immense weight of armour, ships constructed after the plan suggested above, need not be built of such enormous dimensions, and would still be able to carry an equally heavy battery, being at the same time sufficiently powerful as rams to sink with ease any ship afloat. We should then have (for a very considerably reduced cost) ships equal in many respects, and superior in some, to those of the "*Hercules*" class, though with unprotected batteries.

At present, if one of our most expensive ships is promiscuously sent to the bottom by a ram (friendly or otherwise), or by one explosion of a well-directed torpedo, the country loses a large fraction of its naval strength, amounting perhaps to $\frac{1}{16}$. Reducing that expense would admit of an increase in the number, and consequently render the loss of one ship comparatively trifling.

I will conclude this part with a summary of the principles I advocate.

1st. In order to render the ship as unsinkable as possible by artillery (at the expense of her battery being unarmoured), she must have a thick layer of iron-plating at the water-line, and a well-devised arrangement of backing to support it, which will furnish complete protection to her engines and steering gear. In order to render her as unsinkable as possible by ram or torpedo, she must have a complete and perfect system of water-tight compartments.

2nd. That the ship be provided with engines capable of propelling

her 14 knots (though personally I prefer a single engine, further experiments with double engines may prove their superiority); and steering-gear and rudder of the greatest efficiency, both being placed well out of reach of the enemy's guns.

3rd. That the ship have a ram-bow resembling that of Her Majesty's ship "Hercules," and carry a battery of 17 heavy guns, 14 of which shall be broadside guns, the remainder for bow and stern defence.

4th. That a system of armour 10 feet wide surround the ship at the water-line, sufficient to protect her from the fire of heavy artillery; that the bow be lightly armoured as high as the upper deck, and the stern to a height of about 10 feet above water.

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Corvettes.					
“ Challenger ” class	..	..	..	3 ships	} 9
“ Cadmus ”	..	..	..	6 “	
Sloops.					
“ Gannett ”	..	..	..	1 ship	} 2
“ Lyra ”	..	..	..	1 “	
Paddle-frigates.					
“ Terrible ”	..	..	..	1 ship	} 3
“ Valorous ”	..	..	..	2 ships	
Paddle-sloops.					
“ Basilisk ”	..	..	..	8 ships	8

This division contains the oldest cruizers in our Navy. The frigates and corvettes are still used, and many of them are fairly efficient; but all the ships are above eighteen years of age, and belong so entirely to the past that we need not take them into consideration.

It is apparent, from the above lists, that the first division alone contains anything approaching the types that can be advocated for the future cruiser. Doubtless there are some most admirable types in its numbers; but I find two principles omitted in the construction of them, one partially, the other entirely. The principle partially omitted is, the great importance of the power of the *ram*. Why should not all men-of-war, whether cruizers or ironclads, be capable of sinking an enemy by ramming her? It is true that some of the last built cruizers have bows strengthened for ramming, but there is no sharp point, or spur, in the form of their bow, and the shock of an up-and-down bow striking the upright side of an ironclad would be terrible to the rammer, even if fatal to the ship rammed. Whereas a point would enter, and cushion the blow on the bow, at the same time sinking the enemy. In fact, an up-and-down bow strengthened for ramming is the only substitute possible (in vessels built for immense speed), for a more formidable ram, to support which, the extreme fineness of the ship's lines would, to a certain extent, have to be sacrificed. I would suggest a bow of much the same shape as that of Her Majesty's ship "*Hercules*," though not so projecting, but certainly coming to a point at about six or eight feet below water. The principle referred to as "*wholly omitted*" is "*any system of protection to prevent the ship being sunk, or her machinery damaged or destroyed by artillery.*" My opinion is, that by a slight reduction in the length of the ship, and a slight increase of her beam, sufficient floating power would be obtained to enable a 5,000-ton ship to carry a light belt of armour at the water-line, which would materially strengthen her bow for ramming. This belt would be of the following dimensions:—8 feet wide (*i.e.*, $4\frac{1}{2}$ feet below, and $3\frac{1}{2}$ feet above, water), 5 inches thick from before the boilers to the stern, and 4 inches forward. The increase of beam would allow space for larger, and consequently more powerful engines, and would give more room on the gun-deck.

The belt of armour plating at the water-line should be supported by a system of coal-bunkers, similar to those I advocate for ships-of-the-line. This armour may be calculated to resist *all* fire from light guns, and oblique fire from heavy artillery. The chain cables, hung round the United States steamer "Kearsage" during her engagement with the "Alabama," are an illustration of how efficient even the slightest protection of this sort is. The vital parts of the ship are well protected, and she is rendered comparatively unsinkable. My ideas, then, for the future types of cruisers are as follow:—

Full-rigged ships, constructed with ram bows, and lightly armoured at the water-line, in the manner I have described. Ships of 1,000 tons and upward, I divide into five classes, and give their approximate dimensions, in the following table:—

Classes.	Tonnage of Displacement.	Approximate Dimensions.			Armour-belt at water-line.				
					Thickness.		Width.	Approximate weight.	
		Length.	Beam.	Draught	Aft and amid-ships.	Forward		Armour.	Fastenings and backing.
Frigates, 1st class.	5,000	300	58	24	5"	4"	Ft. 8	Tons. 202 ¹	An additional weight of 1 to every 3 tons of armour.
Spar-decked Corvettes, 2nd class.	3,800	270	46	21	4½"	3½"	7	143	
Corvettes, 3rd class.	2,500	235	40	19	4"	3"	6	96	
4th class.	1,800	200	37	17	3½"	2½"	6	66	
Sloops, 5th class.	1,000	180	34	16	3"	2"	5½	47	

The first and second classes would carry 21 guns, of 4½ and 3½ tons respectively; the third, fourth, and fifth classes would carry 17 guns, of from 3 to 1½ tons weight. The frigates and spar-decked corvettes must possess a speed of not less than 15 knots; the third and fourth classes, 14½ knots; and the fifth class, 13½ knots.

The rudder and steering-gear for these ships should be worked as much as possible under the protection of the armour.

Water-tight compartments of the same description as those recommended for the ironclads, will be necessary. In fact, there will be a great similitude in the internal arrangements of all ships, whether ironclads or cruisers.

Gunboats, of less than 1,000 tons, are too small either to carry heavy armour or to have any considerable speed, but all should be capable of attaining from 11 to 12 knots. Vessels of the latest build, such as the "Albatross," "Frolic," and "Mallard" classes, are all that can be required for this type.

¹ It appears that this amount should be doubled (*vide* discussion on the Essay).
—Ed.

It will be observed, that the speed of this description of armour-belted cruiser does not, in some cases, equal that of our present vessels. For instance, Her Majesty's ship "Inconstant," on her trial, made good over 16 knots, which exceeds by $1\frac{1}{2}$ knots the speed I have laid down for my quickest "*belted cruisers*." But, taking into consideration their slightly enlarged mid-ship section, and their fuller bow, supporting the ram, we cannot expect for them, nor do we require, the enormous speed of the "Inconstant." It may happen that some enterprising nation, determined, in case of war, to cut up our commerce, should for this purpose build some extremely fast cruisers. To frustrate any attempt of this sort, I would add another class of vessels to the above list, and give them the name of "*special cruisers*."

These ships should be corvettes of 3,500 tons displacement, with up and down bows, strengthened for ramming, and every other consideration made subordinate to speed; no armour, and not overweighted with a heavy battery. The "Rover" is a good type of this class.

Mr. Thomas Brassey, M.P., in his very able and reliable pamphlet on "unarmoured ships," explains and comments on several points of interest. Among these, he wisely condemns the excessive expenditure on individual ships, and, whilst declaring it will be necessary to build ships for special purposes, brings into prominent notice that "for the tremendous exigencies of war, the fleet might be supplemented and expanded so as to acquire undisputed ascendancy, by "equipping and arming our ocean mail-steamers."

His opinion on this subject I believe to be sound, though personally I am inclined to attach more value than Mr. Brassey does to the importance of actual men-of-war cruisers.

The cost of cruisers has been well argued out in this pamphlet; and, on referring to it, it will be seen that Mr. Brassey strongly urges, "building ships of the smallest dimensions consistent with "the attainment of the requisite speed." I agree with him in this to a certain extent, and would therefore limit the number of ships above 2,500 tons, and increase that of those below it. The number and duties of the cruisers I propose should be somewhat as follows :—

- 6 "*Belted cruisers*" of the 1st class (5,000 tons); of these three would be flagships on the China, Pacific, and East India Stations; the remaining three for special service as flag-ships of detached squadrons.
- 12 "*Belted cruisers*" of the 2nd class (3,800 tons), half of which would be employed as Commodores' ships, and as supplements to squadrons abroad; the other six reserved for special service in detached squadrons.
- 6 "*Special un-armoured cruisers*" of great speed, which would be sent where most required if war were imminent.

The actual number of the smaller classes would not be limited, but the proportion would be about twelve of the 3rd class (2,500 tons); twenty-four of the 4th class (1,800 tons)—N.B. This is the most useful class for service on foreign stations;—eighteen of the 5th class

(1,000 tons); and smaller sloops, despatch vessels, and gun-boats, to the number we possess at present. Ten or twelve, extremely fast, small steamers protected by bullet-proof steel mantlets, and fitted to tow a Harvey torpedo (from their foremast) on each side, would greatly augment the strength of an ironclad fleet in a general action; I would, therefore, recommend their being added to our list of smaller vessels.

With some remarks on two or three questions of minor importance, I will finish this part of the essay.

The first, is the ability to hoist the screw—this I consider indispensable for all cruisers. As they are required to traverse the ocean, and go in and out of harbour under sail, it is most important to have thorough command of the ship under canvas, which cannot be attained with the screw in its position for propelling.

The second is the casing for the screw referred to in Part I. I do not think it will be of service for cruisers, as it must materially diminish the power of the rudder when the screw is not working. This would have the same evil effect as a non-protected fixed screw. But, perhaps, when this new apparatus has been more thoroughly tested, an improvement may be added, by which the ship can be steered under sail with a covered screw in position.

PART III.

Of Ships required for Coast Defence.

I do not know whether it is prejudice on my part or not, but I have never been able to place faith in the "Devastation" class. From the time of the laying of the so-called keel of this ship, I have had an utter distrust of her—there seemed too much likeness to those unfortunate American monitors, so many of which were lost in moving from one port to another during the war. At first, I did not think she would stand the trials necessary to prove her sea-worthiness, but no one reading the satisfactory results of those trials can have a doubt of it. Besides this, I have the testimony of one of our ablest naval men, that she is the most buoyant vessel in a sea-way he had ever been on board of. But a question of more vital importance is, what would her behaviour be in an action, or after it, should she be injured, if a long way from port and experiencing rough weather? I consider this ship so admirably balanced that she is perfectly safe so long as she is intact. But I should like to see her tried, with all her light ironwork (which in action would be pierced by the smallest projectile), open to the wash of the sea. In the first place, the mere fact of steaming at a high speed, under these circumstances, would fill the men's compartment, the armoured deck on which this stands being only one foot above the water-line. This would be done by the bow-wave, which at her full speed reaches the top of the compartment mentioned. Thus an enormous body of water would be lodged on the upper part of the ship forward, reducing her speed considerably and rendering her unsafe as a floating body in a sea-way, in fact, in all probability,

destroying her balance. Confident as I am in her safety in peace-time, I cannot but condemn her as an instrument of war.

The "Inflexible," now building at Portsmouth, is supposed to be an improvement on the "Devastation." She is to carry 20- and 24-inch armour, and an armament of four 81-ton guns. From this casual description, one is led to believe that the "Inflexible" is a most formidable monster. But when we come to enquire into particulars, we are astonished at her want of efficiency as a fighting ship. The armour, impenetrable as it no doubt is, only protects a part, amounting to about one-third of the ship's upper works. This protected part is in the form of a citadel 110 feet long, by 75 feet wide (or the whole beam of the ship), and the armour-plating is in two layers of 10-inch thickness, 16 feet wide (the outer plates at the immediate water-line being 14 inches thick instead of 10 inches). On the top of this breastwork, which rises to a height of 10 feet above the water-line, are the two turrets, so placed at opposite corners of the citadel, that the fire of all four guns can be delivered direct ahead, astern, and on either beam. This battery of four 81-ton guns will be, both in form and dimensions, the most powerful afloat. And yet the safety of this formidable structure depends on a balance, more delicate and more easily disarranged than that of Her Majesty's ship "Devastation," for, the remainder of the ship's side, a length of 200 feet, is totally devoid of outside armour, and the only protection is in the 3-inch armoured deck, 6 feet below the water-line, connected with the lower ends of the athwart-ship breastworks. Thus we see that nearly two-thirds of the upper-works down to 6 feet below the water-line are as easily damaged as the light ironwork of the "Devastation," and in action would be knocked away by the smallest artillery; and so, to the floating power of the comparatively small space below the 3-inch armoured deck, is left the mighty task of keeping this so heavily weighted ship from sinking, and this only on the condition that the armoured deck remained water-tight. The ship's great beam would, however, certainly be of great assistance in preventing her capsizing. There is one point of great value to be observed in the construction of the "Inflexible," viz., the admirable plan of bringing the rudder-head into the ship below the water-line, and working the steering-gear below and under the protection of the armoured deck.

The "Rupert," "Glatton," "Hotspur," and "Cyclops" classes are, in my opinion, even less valuable as types of fighting ships. It is true that they are not intended for sea-going purposes, but to my mind, all ships-of-war, whether for ocean-warfare, or for coast-defence, must be constructed with a reserve of floating power, which would enable them to be seaworthy when seriously injured. This is certainly not the case with these ships.

Our vessels for coast defence at present number in their ranks:—

- 1st. The "Inflexible" (11,165 tons);
- 2nd. The "Dreadnought" (10,950 tons); "Devastation" and "Thunderer" (both 9,190 tons);
- 3rd. The "Rupert" (5,444 tons) "Glatton" (4,912 tons); "Hotspur" (4,010);

- 4th. The "Cyclops," "Hecate," "Hydra," and "Gorgon," (3,430 tons);
 5th. "Royal Sovereign" (5,080 tons); and "Prince Albert" (3,905 tons);

the first turret ships constructed. From what I have said before, it may be perceived that I do not agree with the principles on which these ships are built.

There is a type of vessel, so novel in its construction, so opposed in its form to all that has gone before, that our naval architects have not, as yet, undertaken the responsibility of giving it a trial. I refer to the circular ironclads, the type of which was first designed by the late Mr. John Elder, and on the subject of which he lectured at the Royal United Service Institution in May, 1868.

The Russian shipbuilders, more adventuresome than ourselves, have taken the lead and have already constructed two circular ironclads, the "Novgorod," which is completed and has been tried, and the "Popoffka," now nearly completed, which is building at Nicholaeff, entirely from Russian resources, under the direction of Admiral Popoff. These vessels are poor specimens of a type, which I believe will prove, when developed and more thoroughly tried, the most perfect for coast defence.

The "Novgorod" is a circular monitor of 2,490 tons displacement, and of 480 horse-power. Her diameter is 101 English feet, and she draws 13 feet 2 inches with all stores on board. Her armoured breastwork is (with the backing) 11 inches of iron. The deck, outside the breastwork, is plated with 2½ inches of iron. She carries two 28-ton steel guns, working inside the breastwork. She is propelled by six screws, and on her trial she attained a speed of between 7 and 8 knots. Her cost was about £330,000. To my mind, vessels of this class would be of more value if of greater size, and the cost of the larger vessels would be in proportion considerably less.

I would invite attention to the late Mr. John Elder's able paper on this subject, published in the Journal of the Royal United Service Institution, No. 52, though in many points I do not quite agree with it. I think Mr. Elder overrates the power of this type when he says, "that there is no reason why a vessel of the same displacement as one of our best ironclads, but circular in form, may not be propelled at an equally high rate of speed," &c. My opinion is, that a speed of from 8 to 10 knots is quite sufficient for coast defence vessels such as these, whose motive power is only required in moving them from one part of the coast to another, where they would act as floating and movable forts, for its protection against an invading force.

I should be inclined to adopt a system of propulsion, by means of three, or six screws after the Russian plan, in preference to the arrangement of hydraulic propelling apparatus, which Mr. Elder recommends, until we know more of water-power as a propeller for ships.

On the question of ramming also, I do not hold Mr. Elder's opinion. For, in my belief, a circular vessel is not competent, neither is she required to be used as a ram. In fact, this type of vessel is

exactly what we want, without either great speed or the power of ramming. Her invaluable qualities are, undoubted floating power, comparatively small draught of water, impenetrability by artillery, power to resist the attack of rams, and ability to carry the heaviest possible ordnance.

I see in this form of vessel the only floating body that can possibly combine these all-important qualities. Great value may be attached to the arguments that the reading of Mr. Elder's paper gave rise to, and it will be observed that the admirable qualities of this circular ironclad were recognized by all the scientific men present; and that the only two questions not agreed upon were—first, as to the possibility of steering her on a straight course; and secondly, of her attaining the extreme speed hoped for by the author. The first of these questions has been satisfactorily solved by the trials of the Russian "Novgorod;" and the second, by the fact that such extreme speed is not necessary for coast defence.

Mastless circular vessels for coast defence would be, I propose, of two classes:

The type of the first class would be a vessel of about 8,500 tons, 210 feet in diameter, carrying batteries of twelve 12-inch 35-ton guns, mounted on an improved Moncreiff system, behind a breastwork of 14-inch armour, 6 feet high, and circular in form, with a diameter of 100 feet. The deck outside this breastwork to curve downward towards its outer edge, and to be plated with $3\frac{1}{2}$ -inch iron. The under surface nearest the edge would also be plated with $3\frac{1}{2}$ -inch armour. The edge itself would be protected by a steel rim of immense strength, sharpened so as to cut the bow of a vessel ramming her. This circular vessel would be propelled by three screws, and engines sufficiently powerful to give her a speed of 10 knots. In order to ensure her having a good grip of the water, I propose constructing four keels, in the same direction as, and between which, the screw shafts will work. The lower surface of these keels will form a flat bottom, so that the vessel can be, without danger, landed on a gridiron. (Plate III, fig. 1.)

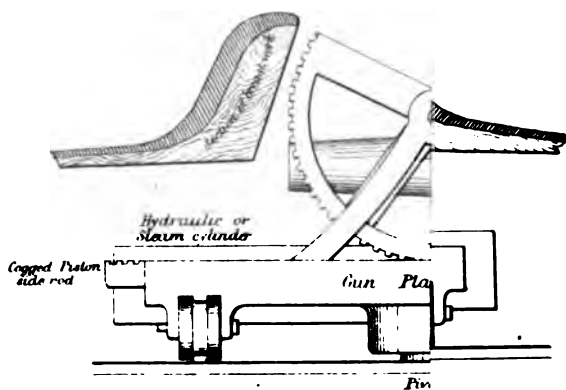
In the after ends of the centre keels would be two powerful rudders, which would give the ship efficient turning power. Approximate weight of armour of this first class: breastwork,—500 tons; upper surface of armoured deck, 1,700 tons; under surface, 450 tons; the total weight being about the same as that of Her Majesty's ship "Devastation." The construction of this vessel is less complicated than that of ordinary iron ships, the difference being (as Mr. Elder says) "that the frames and floors, instead of extending from keel to gun-wale athwart ships, radiate from the centre to gunwale at the outer edge; every frame and floor being the same length and form." Nothing is simpler than the division of the interior of this form of ship into water-tight compartments. When afloat, her edge would be three feet above water, the principal horizontal deck being on this level, and all the space below divided into small cells by bulkheads radiating from the centre, intersected by others, following the circular form of the ship. All the bulkheads, from the outside edge to 35 feet towards the centre, would be continued upwards beyond this prin-





Fig. 2

Showing gun in posit.



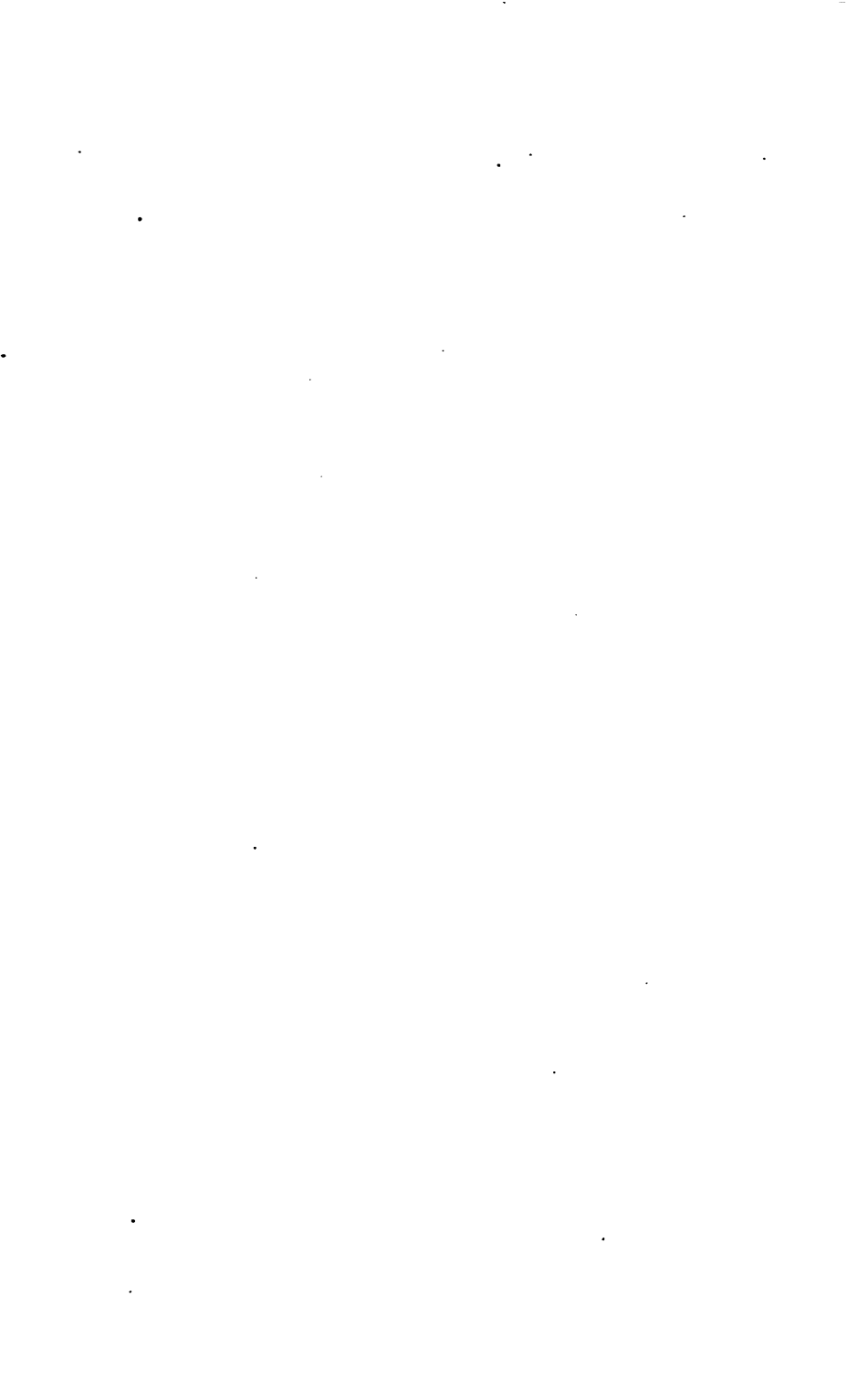
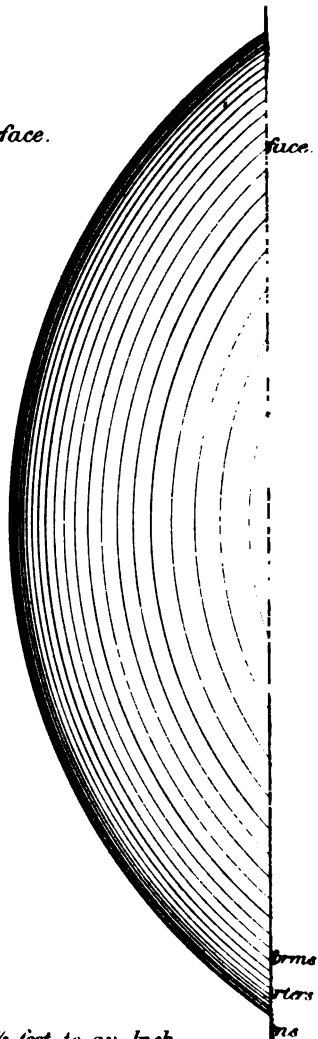


Plate 3

Fig 1.
Lower Surface.



Scale . 33 1/3 feet to an Inch.

cipal horizontal deck, and join the curved armoured deck above. (Plate II, fig. 1, and Plate III, fig. 1.)

The twelve guns will be arranged at equal intervals on the horizontal deck, within the circular breastwork, and their carriages would be made to revolve on a pivot in their centre (which will be about six feet from the breastwork towards the centre of the ship), so as to enable the guns to range over an arc of 120° . The guns, when in position for firing, would be seen from outside "en barbette" (Plate II, fig. 3), the recoil would bring them into position for loading (Plate II, fig. 2), from under the armoured deck. The degree of training provided for, would admit of five of these monster guns being pointed in the same direction. When fired from the position of their extreme training, it would probably be found that the concussion of the explosion would be very much felt in-board. In order to rectify this, I would suggest, that horizontal platforms be arranged between the guns, on a level with the top of the breastwork, and extending about five feet in-board. In the centre of the ship there must be a conning-tower, provided with a rifle-proof cover, from under which the captain can look over the breastwork, and direct his ship in action.

The type of the second class would be a vessel of about 5,000 tons displacement, 150 feet in diameter, carrying a battery of twelve 10-inch 18-ton guns, mounted behind a circular breastwork of 12-inch armour, 5 feet high, the diameter of which circle would be 80 feet; the plating of the outside deck 3 inches thick. The approximate weight of armour for this vessel would be:—breastwork, 270 tons; upper surface of armoured deck, 700 tons; under surface of edge, 230 tons; total weight about 1,200 tons. The whole vessel is constructed on the same principle as that of the first class. In all probability, there will be at first great opposition to this innovation; but I am positive that, once tried, this type will be universally adopted for coast defence.

In addition to these floating forts, we require, for the protection of our coasts, small torpedo vessels and gunboats.

The Americans have recently launched a torpedo vessel, by name the "Alarm," which was described in *The Army and Navy Journal* a short time ago. She is 100 feet long, 28 feet beam, 10 feet draught, has a ram-bow, and carries one heavy gun and eight Gatlings, in addition to her torpedo-gear, which is reported to be very perfect. This class of vessel is of undoubted value as a coast-defence, which we should probably realize to our cost, in the event of war with the United States. But the handling of such dangerous instruments as torpedoes on board ship, is so apt to prove as fatal to the workers of them as to the enemy, that they would be a questionable advantage to this nation, whose coasts are so admirably defended in other ways.

Gunboats of the "Comet" class, carrying one gun of great weight, will be found an exceedingly useful addition to the defences of the coast, and the fact of our possessing twenty-four of them already, is very satisfactory.

In order to have an efficient coast-defence fleet, we ought, in my

opinion, to possess four circular ironclads of the first class (about 8,500 tons), for the Thames and south coast ports; six circular ironclads of the second class (about 5,000 tons), to be stationed at other ports in the United Kingdom; and thirty gunboats of the "Comet" class divided along the coast, where most required. To these, torpedo vessels may be added, when a really valuable type has been introduced.

Monday, March 27th, 1876.

ADMIRAL SIR HENRY J. CODRINGTON, K.C.B., in the Chair.

DISCUSSION ON THE NAVAL PRIZE ESSAY, ON "THE BEST TYPES OF WAR VESSELS FOR THE BRITISH NAVY."

Admiral Sir SPENCER ROBINSON: Sir Henry Codrington, when I was invited to come here and discuss this subject I naturally felt some little doubt as to the nature of the discussion, because I did not quite understand whether the prize had already been awarded or whether we were called upon to discuss the merits of the essay itself as deserving the prize. We now understand that the medal has been awarded to the author of this Essay, and, therefore, that the discussion that we have to enter upon, is a discussion as to whether this Institution can recommend the new type of ship which Captain Noel has so cleverly and so ingeniously advocated, and which has received the approbation of the referees. In discussing this subject I must ask the Chairman and everybody here to allow me, what I am not only most willing, but most anxious always to concede to everyone with whom I may be brought into discussion, I mean perfect liberty of speech, that I may be allowed to say what I think upon each topic as it arises, and that no one—neither the talented author, nor his friends, nor the referees who have awarded him this medal—will consider that in anything I say, I have the smallest desire personally to be offensive or disagreeable to them; but that I simply stand forward to advocate such principles as I believe to be right and perfectly legitimate principles to hold; and as to any part I may take in this discussion, and any language I may use, I beg leave at once beforehand if anything looks personal, or might be construed into giving offence, to apologise for using such language. All I wish, is to have a discussion on a subject of vital importance to the British Navy, perfectly unfettered in the line of argument that any gentleman or myself may think fit to adopt.

Having cleared the way, I should like just to say one or two things before I really go into the subject of the merits or demerits of the Prize-essay. I think it would be extremely unfair, and I should feel that I was doing wrong if I put the weight of my years or authority in any way to override the opinions of a young commander who has written upon subjects of the greatest possible importance. I think that every one in our profession, and probably every one of those who are out of it, will consider that the trouble, the time, the ingenuity and talent that that gentleman has displayed in writing the Essay, is worthy of all commendation; and that, even when we most differ from him, we ought to treat the opinions he has been kind enough to lay before us, with every possible consideration, tenderness, and regard. I find it necessary, as I am sure the author of this Essay found it necessary, to clear the road before considering that type of ship which he considers best adapted for our ironclad navy, and to do so by observing that all the types of the ironclad navy now in existence are serious and unreservedly condemned by the author of that essay. Nay, more, it appears to me that if he had not completely and unreservedly condemned those types he would not have had a *locus standi* for introducing to our consideration a type of warship—a type of ironclad as he calls it—so entirely different from anything that has gone before it. He pre-supposes,—and I follow him in his pre-supposition,—that the whole of these types being extremely defective¹ it is

¹ Page 1. "We find ourselves unable to arrive at a conclusion as to which is the "most satisfactory type."

Page 2. "But grand as our fleet is collectively, it is not satisfactory to observe

absolutely necessary without delay to produce a novel type, and that this type with all the disadvantages that may attend upon it, is better and more fit for the purpose of an ironclad navy than the types that have gone before it. It is necessary, therefore, to examine why he finds fault with the types of ironclads that have gone before, to see whether his reasons are such as the facts of the case will bear out.

I should like to begin with what he said about the "Iron Duke" class. He said of the "Iron Duke's" class that they were generally considered as failures; and he has described the class by a quotation from *Blackwood's Magazine*.¹ In that quotation there are two rather important errors. He has, however, declared the "Iron Duke's" class to be a failure. Now I should like to ask every gentleman in the room what he means by the word "failure." If you design a tool to perform certain work and it performs that work, is it a failure? If you aim at a given object, and you hit that object, is that a failure? If the "Iron Duke" was designed to do certain work, and she does that work, is she a failure? Is a ship a failure because you having aimed at one object, have realised that object, but have not aimed at another object, and have not realised that other object? I should say certainly not. What is an ironclad, I may ask, designed for? An ironclad is designed to fight such battles on the seas as we may be compelled to fight with weapons equal or superior to those that are brought against us. I should like to compare for a moment an ironclad of the second class, such as the "Defence," with the "Audacious"; comparing the latter first of all with the ironclads designed in earlier days by naval constructors in England, and secondly with the second class ironclad of any foreign power with which she might be called on to cope. Allow me first of all to take you to the "Defence," which was the first of the second class ironclads designed in England, and show you the difference between the "Defence" and the "Iron Duke." The length of the "Defence" is 280 feet, breadth 54 feet, mean draught of water 25 feet 1 inch, height of ports out of water 6 feet 6 inches. She was 6,070 tons displacement, carried 607 tons of 4½-inch armour, mounted two 8-inch and eight 7-inch guns. Her speed was 11·6 knots, and her powers of action limited by 460 tons [of coal]. The "Iron Duke," designed as a second-class ironclad, was 280 feet long, 45 feet wide, her mean draught of water 22 feet, height of ports 8 feet 1 inch, displacement 6,034; she

"that of all the types represented therein few can truly be called the recognised types of the future, and these few are of minor importance."

Page 8. "Besides this (the enormous cost) the 'Sultan' has the defect of excessive top weight, to counterbalance which, 600 tons of ballast have already been put into her, and, indeed, in all these vessels the fact of protecting their batteries with heavy armour is, in my opinion, a questionable principle, for by so doing, the size of the battery is curtailed, and the ship is rendered crank. The 'Monarch' would be subject to the same objections as the 'Hercules.' The second class includes the 'Audacious' and her five sister ships. These, though powerful vessels, are generally considered failures. Insufficiently plated at the water-line, overburdened with heavily armoured box-batteries above the upper decks, their first trial proved them so excessively crank as to be wholly unseaworthy."

Page 18. "Confident as I am of her safety [the 'Devastation'] in peace-time, I cannot but condemn her as an instrument of war."

Page 18. "But when we come to inquire into particulars, we are astonished at her want of efficiency as a fighting ship" [the "Inflexible."]

Page 19. "From what I have said before, it may be perceived that I do not agree with the principles on which these ships are built—viz., all the turret-armed ships in the navy."

¹ "The 'Audacious,' when broadside on, presents an area of 6,670 superficial feet; of these only 3,277, or less than half, are plated at all. There is a patch of 100 feet by 3 at the water-line, of 8 inches armour, which tapers down to 4½ inches at the bow and stern, and the rest of the ship has nowhere any thicker armour than 6 inches, the ends of the main-deck battery having only 4 or 5 inches armour, while the ends of the upper-deck battery are unprotected against a raking fire; and more than half the ship's side is in the same unprotected state."

carried 924 tons of 8-inch, 6-inch, and 4½-inch armour, ten 9-inch guns; her speed was 18½, and she carried 540 tons of coal. And now that I am on the subject of the armour plating of the "Iron Duke," I may as well refer to that description in *Blackwood* which says that the ship had only got a very limited portion of 8-inch armour, and the rest was entirely built up of smaller armour, and that there was, with the exception of its belt on the water line of 8 inches, nowhere any other thicker armour than 6 inches, and also to the statement that the armour-plated upper-deck battery was undefended against raking fire. All these facts are liable to very great correction, which I proceed to give. Not only is there an 8-inch armour-plate streak above the water-line of the "Iron Duke," class,¹ but in the wake of the ports, that is, in the important place where the pivoting of the guns is secured, on which the whole efficiency of the battery depends, there is a strip of 8-inch armour. The armour at the corners of the upper deck battery is 5½-inch thick; and there are two thwart-ship bulkheads protecting it against raking fire, reduced to 4½ inches in thickness only where no man would be stationed in action; and any direct shot coming upon one of those bulkheads must have passed through the ship's side or extremities before it could get there. If it came in a straight line it would walk out interfering probably with nobody. Of course it might be perverse and do other mischief, which I cannot describe at this moment, but at any rate, the badly defended state of the "Iron Duke's" class, about which the author of this pamphlet seems to have been seriously concerned, and which tempted the writer in *Blackwood* to say how little the iron-clad ships were defended, does not seem to me to stand on very serious ground. Having shown you the difference between the second-class armour-plated ship, the type of which is so unreservedly condemned, and the former second-class ironclad, allow me to proceed to show you the comparison between this second-class ironclad and the French ships. The French, at the time this ship was built, had two classes of ships afloat—the one represented by the "Flandre," of which type there were ten—the "Surveillante," "Valeureuse," and a number whose names I do not recollect at this moment. They were first-class French ships; and bearing in mind what I have told you about the dimensions and thickness of the armour plating and the armament of the second-class English ship, allow me to read you the dimensions, thickness of armour plating, &c., of the French first-class armoured ship. The French first-class armoured ship of that day, as represented by the "Flandre," was 262 feet long, 55 feet 9 inches beam, draught of water, 25 feet 3 inches, height of port 7 feet 8 inches, displacement 5,711, carrying 980 tons of armour, 4⅞ inches thick, mounting 8 guns of 9·44 calibre, speed 14 knots. I ought to have said before, in stating the armament of these ships, that I only gave their protected guns, because all of them, both in our own and the French navy, have guns which are not under armour plating, and these I have omitted for obvious reasons. There was a second-class French ship at that date. The ships I have described are first-class, and if you compare the power of the first-class French ship with the second-class English ship, I think nobody will say that there was any very great disadvantage in the English second-class ship if it had to encounter a French first-class ship. The second-class French ship was 230 feet long, beam 45 feet 9 inches, mean draught of water 19 feet 6 inches, height of port 6 feet 6 inches, displacement 3,400 tons; she carried 760 tons of armour-plate varying from 5·8 inches to 4 inches in thickness, and carried four 7-inch guns: speed was 12 knots. With these figures before us, I am at a loss to find in what respects the "Iron Duke" failed in the object for which she was constructed. What was that object? It was to fight on the sea any ship she might meet of her own size and construction, and to give the 460 men who embarked in that ship the means of fighting such an enemy as it might be their duty to engage, on fair and equal terms. I ask whether it is not evident that the "Iron Duke's" class would have fulfilled the purpose for which she was designed, and whether that type can reasonably or truthfully be set down as a failure. The officer who has written this essay founds, as he well may, the whole of his desire for a new type of ship upon

¹ This statement is erroneous—there is not any 8-inch armour above the belt in these ships—the mistake arose from my reading the figures I had taken out for the "Sultan" instead of those I had extracted for the "Iron Duke's" class.—R. S. R.

the supposed failure of the old types. I say there is no evidence of failure whatever, and that their unproved failure does not constitute a necessity for a new class of ship. Something more may be said. It is true that this second-class ironclad is not impenetrable to shot. But what naval architect in this world ever designed a ship that should be impenetrable to all and every shot under all circumstances. No greater error could possibly be committed than to believe that such a thing was ever possible or contemplated. No monitor, no circular-constructed ironclad, no ship ever put together by human hands could, under certain given circumstances, resist the power of modern artillery. But is that a reason that partial and relative protection should not be given? Partial and relative protection against such attacks as it was probable could be made. Partial and relative protection was aimed at in this second-class ship. I have shown you that partial and relative protection has been given to these ships when compared with those of any foreign power that they could have been brought into contact with, because, I need not tell you that at the time when these ships were designed, powerful artillery, and the very powerful ships since built to resist that artillery were not in existence. There is one thing more I wish to say about this ship. The author of this work has been very severe upon the ballast that was put into these ships. One of his objections to them is that they were topheavy. The facts of the case lie in a very small compass, and perhaps I may be allowed to allude to them. These ships were built as lightly in the lower parts as was consistent with sufficient strength, with an express view and intention that they should be lighter than the strict following out of the design would have made them, in fact, weight was spared below so far as it could be spared to introduce it elsewhere. It was known that the work had been carried out with that effect, but how far that work had proceeded could only be known precisely by the trials of the ships. They were tried light; they were not at their load line at the time of trial, and they showed very considerable crankness under such circumstances. But what did this prove? It proved what the constructors of the Navy knew perfectly well, that if their instructions had been carried out in various details, not quite easy to calculate, ballast would probably be necessary, and 360 not 400 tons of ballast was put into them. Now 360 tons of ballast on a displacement of 6,000 tons is not a very great deal. I remember, when I was a young man, I used to see line-of-battle ships going about with 600 and 700 tons of ballast in them. Our old wooden ships, displacing about 4,600 tons, had an establishment of from 300 to 400 tons of ballast. I remember meeting a very magnificent French ship at Lisbon, when your Chairman and myself were in command of frigates there: this line-of-battle ship, with a displacement of 5,000 tons, carried 800 tons of ballast. Therefore, although I am perfectly willing to admit that a slight error was committed, I do not think the adding of 360 tons of ballast to the "Iron Duke's" class at all justifies any condemnation of the type. I admit the necessity for doing so is an error, but it is one of detail in construction, not affecting the type or deserving the word failure as applied to the design. The result of putting in this ballast was to make a difference of about 5 inches in the height of the mid-ship port. It was to have been 8 feet 6 inches out of the water and was reduced to 3 feet 1 inch, and even then the height of the port-sill was more than in the French first-class ship and very much more than in the French second-class ship. The stability of the ship and her sea-going qualities proved perfectly satisfactory. The curve of stability was taken: the ship could be heeled over to 44½ degrees before she began to lose her stability in the smallest degree, and the stability did not vanish till she was laid over to upwards of 86 degrees. I fancy no one would have the least doubt of the perfect seaworthiness of such a ship, even if the class had not been at sea in every part of the world. The next type is the "Hercules" type, which also has been condemned by the author of this Essay, and if he had not condemned it, he could not have advocated the new type he has brought forward. I should like to compare this type also with the first first-class ship of our own ironclad Navy, and with the French first-class ship, to see whether there is really in her, any deficiency in armament or sea-going qualities, or if the "Hercules," as compared with any sea-going ship whatever she can possibly meet upon the ocean, is under any disadvantage. The first type of our first-class ironclad will be admitted by every one to have been the "Achilles." I put the "Warrior" and "Black

"Prince" entirely out of the question as first-class ironclads; but the first first-class ironclad this country did possess was a very beautiful and powerful ship, the "Achilles." Let us compare the "Achilles" with the "Hercules." The "Achilles" has a length of 380 feet, beam 58 feet 3½ inches; draught of water 26 feet 10 inches, height of port 8 feet 8 inches, displacement 9,094 tons. She carried 1,250 tons of 4½-inch armour plating, and under that protection in her battery, 18 7-inch and 4 8-inch guns. Her speed is 14½. The "Hercules" has a length of 325 feet, beam 59½ feet, mean draught 25 feet 4 inches, height of port 9 feet 8 inches, displacement 8,840 tons. She carried 1,239 tons of 9-, 8-, and 6-inch armour, and mounted on her protected battery 8 10-inch guns and 2 9-inch guns, and this ship's speed was 14½ knots. You cannot doubt that the "Hercules" was a very superior ship to the other. The object of designing the "Hercules" was to have a very great improvement over the first-class English ironclad previously designed, and at any rate in this sense the "Hercules" may be said to have been a success. But let us compare the "Hercules" with a first-class French ship. The French first-class ironclad of that date is represented by the "Friedland," the "Marengo," and others. The "Friedland" is 287 feet long, with a beam of 57 feet 3 inches, mean draught, 26 feet 6 inches, height of port 9 feet, displacement 7,180, weight of armour 1,300 tons of 7-, 8-, 6-, 2-, and 4-inch armour. She carries in her protected battery 4 guns of 10½-inch calibre, and 4 9½-inch calibre guns in towers or *barbette*. Her speed is 14 knots. I do not hesitate to say that there is no comparison possible except an advantageous one to the English type between the power of the two ships; that the "Hercules," or that type of ship, could with great probability of success, and with as much confidence as attends anything human, engage a first-class French ironclad, and engage her with every prospect of being victorious.

The "Sultan" is a little more powerful than the "Hercules," and there is another French ship at sea, the "Richelieu," a little more powerful than the "Friedland." But in point of fact those ships are on the same principles, and an enlargement of type does not mean an alteration of type. Changes in the details of various fittings, and in the constructive arrangement in a ship, do not mean a new type of vessel. It is impossible to suppose that we shall not day by day find out details that may be advantageously applied to our new ships, but because a detail can be better considered now, and be better carried into operation in this day than it could have been five years ago, is that any reason for resorting altogether to another type of war-ship? I say this because in part of the very interesting extracts from the essay which our Chairman gave us, descriptions of additional compartments, an additional number of bulkheads were strongly insisted upon. As to that, every one who has considered the subject for a moment would agree. The more you could divide a ship into water-tight compartments the better; the more you could make her a series of cells the better; but it is not necessary by any means to resort to a new type of ship in order to divide her into a great many more water-tight compartments than has been done hitherto, in order to adopt the cellular system as far as possible, and to take the precaution of having all your sea-connections at hand, visible and more perfectly available than in some recent cases they appear to have been. But not only does my comparison of the type of the "Hercules" apply to the sea-going ships of France; my comparison applies also to the sea-going ships of every other country. The type of the "Hercules" and "Sultan" enables us to be perfectly sure that we send our sailors to sea to fight any enemy that they might meet on the open sea with a well-founded confidence of victory before them. The Russians, the Germans, and, strange as it may seem, the Turks have, it is true, one or two ships—that is to say that each of them has got one ship of rather more power than the "Hercules." But there is everywhere the same type, and that type is this,—you protect the water-line of your ship by a belt; you protect the battery and the vital parts of the engines and boilers by armour; you protect your men and guns over a limited space, because you cannot have sea-going qualities if you protect them over an unlimited space. And that is the type of ship represented in small ships by the "Iron Duke's" class, and in large ships by the "Hercules" class, and that is the type of first-class ironclad which throughout the world at this day we shall meet, if ever we meet in hostility at sea.

There is one more class I must say a word or two about, before I refer to the ship

that is proposed to sweep away all that we have done, to take a place for herself, and a victorious place, over such vessels as it has been my pleasure to see at sea, and to know something of their qualities. This ship is the "Devastation." The "Devastation" is certainly in some respects peculiar, and I should have expected rather to have heard a word or two in commendation of the "Devastation" from the talented author of this Essay. But no! he dislikes the "Devastation." He reminds me of the old saying applied to Mr. Addington, one of our Prime Ministers:—

"I do not like thee, Dr. Fell,
The reason why I cannot tell,
But still I feel to know full well
I do not like thee, Dr. Fell."

That is all I can find as a reason for condemning the "Devastation." Well, "kissing goes by favour," and it is very possible that a gallant Officer, who does not like the "Devastation" now, may yet live to see that the "Devastation" has got some very powerful qualities, and is not, after all, to be summarily condemned as an instrument of war. I may say, the "Devastation" takes to sea four of the heaviest rifled guns yet constructed in this country. She takes those guns to sea at a height of fourteen feet above the water. She takes them in two turrets, protected by 14-inch armour. The hull of the ship that bears those turrets is protected by 12 and 10-inch armour. There are bulkheads, which cut off all access of dropping shot from the vital parts of the ship. She has a speed of 18·8 knots; she can reverse her powerful qualities as a ram in two minutes and two seconds—that is, she could be charging in one direction at the rate of 16 statute miles an hour, and in two minutes she could be charging in the opposite direction at the same rate of speed. She has been in gales of wind on the Atlantic; she has been exposed to such weather as she could find on the coast of Ireland; she has crossed the Bay of Biscay; she has done good service in the Mediterranean, with eminent satisfaction to everybody on board. She carries 1,200 or 1,400 tons of coal, and the radius of her operation is only measured by the distance that coal will carry her. At ten knots an hour, she will go upwards of 3,000 miles without exhausting her fuel. I am unwilling, therefore, that so valuable a type of British ironclad should pass under, what I consider, the indiscriminating and undeserved censure of the gallant Officer who has written this Essay; because, as a British sailor and a British Admiral, I feel convinced, if it ever should come to pass that our fleet should be tested, the account that the "Devastation" will give of herself on the day of battle will dispel a cloud of, what I venture to call, prejudice, which still hangs over her.

Now, I have described the three types of ships which have been absolutely condemned by the author of this Essay, and on which condemnation he has founded the only type of battle-ship he has proposed to use; and I am about to make some few observations on the type he has advocated. First of all, I may say, if he was right in his condemnation of these old types, I consider he was perfectly right in proposing a new type. It is for that reason I have dwelt so long upon the valuable qualities of the old types, because I think, if my position were entirely wrong, if it were true that these types were not at all valuable, and deserved what he has said of them, it would be absolutely necessary, without delay, to invent a new type; and that many disadvantages that we might otherwise find in his proposed type ought to have little weight in our judgment, seeing the pressing and urgent necessity of adopting a new principle. Now I have got an observation to make upon this new type of ship. The author has not given us many details, but we all know that, to judge of the qualities of a ship proposed to us, a great many calculations must be entered into, a great many statements must be made, before we can simply adopt or reject the idea of the ship presented to us. The details that he has put forward as to the rudder, and various things of that kind, are all exceedingly good in their way, and, no doubt, perfectly applicable to old types as well as to new. His principle, as far as it is developed, is this: He says, speaking of the old types, "The ship is only partially and imperfectly defended, and the partial and imperfect defence of the battery and of the guns has led you to cover the vital parts of a ship with an imperfect protection also. I will do away with that; I will remove the imperfect protection you have given to your gun and armament, and I will

"apply it to your water-line." What do we find? The first thing I find that the *Essayist* proposes to do, is the very thing that he has found fault with as exemplified in the old types, namely, "imperfect protection." I will show you at once how it is. He takes two classes of his proposed ships, and he gives you a belt of 14-inch armour for the first-class ship, and for the second-class ship 10-inch armour; and, to my surprise, it is to taper, 100 feet from the stern of the ship, to one-half its entire thickness. Thus, this 10-inch armour is to taper to five inches at the bow, and at the stern it is diminished by twelve inches, so that under the counter he has only two inches of armour. Now, it is undeniable, that tapered armour plating is, in a certain sense, a defect; for a ship is not so strong with armour tapered as she would be with armour of the same thickness all over the ship. But it is an inevitable necessity, and we all lament the necessity which prevents us from protecting the extremities or any part of a ship with 10 and 12-inch armour, while we can defend her sides with 12 and 14-inch plates, but it is an inevitable law of nature, of universal application. Well, in this *Essay* we find ourselves condemned for having tapered the armour plating in the old ships because of its imperfect protection, and here is the new ship with a greater taper than we ever ventured on in the old ships. Therefore, the imperfect protection, instead of being cured in this new type, remains an imperfect protection still, and liable to be pierced and to be destroyed at that very water-line, to defend which, he is so ready to make sacrifices. But let us see what these sacrifices are. We have sacrificed the imperfect, though very considerable, protection that we gave to our artillery and to the men who work the guns. The *Essayist* takes away the whole of the armour from the guns and from the men. Now, as has been said at the beginning of this discussion, the whole object of an ironclad is to contend on equal, or even on better, terms with another ironclad. If nobody in the world had ever built an ironclad, I do not know that we should have done so; but what we did feel was, that as long as anybody else had got such a weapon, imperfect as it was, full of faults as it was, still such a weapon was so powerful, that a similar weapon must be provided to contend against it on, at any rate, not unequal terms. We ask no more. We do not ask, because it is not possible, to go about in impenetrable ships, free from all hurt to ourselves while dealing destruction around us; but we ask that we shall not be caught at a disadvantage, that we shall have a ship as good as anybody has, and then we, under Providence, will answer for ourselves. But here the *Essayist*, in order to procure this very imperfect protection at the water-line, takes away the whole protection from the men and from the guns. I ask any one for one moment to consider what the effect of a broadside of the "Sultan's" 10-inch guns would be upon that war-ship which he has described, a ship which will carry, I admit, one-third more guns than the "Hercules" does, because the "Hercules" battery is limited to the protection we can afford to give it by armour, and the battery of the new ship is entirely unprotected, and, therefore, might oppose fifteen guns to the "Hercules" ten. But what would be the result at 1,200 yards of shot from the 10-inch guns of the "Hercules" striking against the battery of a ship built, as the *Essayist* proposes, of thin iron. Has any gentleman ever seen a target representing the unarmoured side of an iron ship, and noticed the effect of the shell striking that target? If he has, he will say with me, that the ravage it commits is fearful to look at. And then, as there is no limitation, no concentration of the armament of such a ship, but as the guns are spread pretty nearly from one end of the ship to the other, the aim of the opposing gunner will be very much easier; he has a much larger object to fire at; he is not bound exactly to fire at the centre of the protected part of the ship. To do any damage to the protected battery, the fire must be directed to that spot where the space is limited and the execution uncertain; but against the unprotected battery he has only to hit the ship somewhere above the water-line, and he kills men by scores, sweeps the decks, destroys the guns, and ruins the structure. I confess to have very great regard for the gallant Officer who has written this admirable *Essay*, I hope that his talents may be profitably employed for the benefit of his country, I wish that every good may befall him in his profession, and that he may rapidly rise to hold high command in Her Majesty's ships; but this I should regret; I should regret nothing so much as to see him in command of a British war-ship, manned with 600 men, defended in the manner he has described here, and of the

type just referred to. If he went into action, I should shake hands with him, knowing the unavailing gallantry he would certainly display, but I am perfectly certain that I should never see him again.

Although I am very far from having exhausted the observations I might make upon this type of ship, I must draw to a conclusion; and although one of the very strongest points of my objection to the type which he has so ably advocated is this, I can only just hint at it; supposing that the armour-plated belt rises 5 feet above the water-line, there are the uptakes, crowns of the boilers, the whole motive-power of the ship absolutely undefended either from direct or indirect fire. The ship is defended in the most inconsistent way possible, and one might almost smile if such a subject as this could be treated in any way except seriously. She is almost undefended from raking fire; for strange to say, after all the objection the Essayist has made to the partial protection afforded by her armour-plating, he has himself, in this very new type that he introduces to our notice, put up what he calls a thin bit of armour at the bow and stern. What effect can a thin bit of armour have in resisting such shot as those of the 12-inch guns of the "Devastation" and of the 10-inch guns of the "Hercules?" A shot fired with any sort of command of height above where the armour plating stops in the ship, travels where it pleases, does what it likes; and I am sorry to say, as effectually condemns that type, and more clearly than any words I can produce. One would have thought Captain Noel would have had a word or two to say in favour of the "Inflexible" type, but no: he has studied the "Inflexible" type, and he finds that her "balance"—a term which, without meaning any discourtesy to the gallant officer, I have in vain endeavoured to understand—is such that on the water being admitted where it may be admitted if the ship is penetrated by shot, the result will be very unfavourable. Accordingly, he dislikes her exceedingly. Now I am not competent to stand up and speak of the qualities of the "Inflexible." She has been designed by those gentlemen whose application to this subject, and whose excellent mode of studying those questions in every way, I have long known and appreciated, and therefore I think I may say with well-founded confidence that I have the highest and strongest belief that the "Inflexible" has been considered in every point, that this "balance," which is to worry them a great deal, has been properly considered, and the "Inflexible" will turn out in every respect one of the most formidable instruments of war ever seen upon an ocean. I see one or two gentlemen connected with naval construction in this room, and it rather prevents me from saying a word or two which I should very much like to say as to their talent and power to advise and design all that is wanted for the British navy. I knew this well, having received many proofs of it, and can speak with perfect impartiality in that matter. But they are present, and I do not like to praise them very much to their faces. So about that I shall say no more. One or two of them no doubt will take up the subject of the "Inflexible," and say what I am not able to say from want of proper acquaintance with the principles of her design. The author of this Essay may perhaps endeavour to justify in some measure the new type of ship by an allusion to the "Shannon," therefore I wish to make the whole of my observations complete by referring myself to that ship. The "Shannon" partakes in many respects of the type of vessel he has proposed for an ironclad warship. Those gentlemen who are responsible for our Navy, and the present Controller of the Navy, one of the most practical and thoroughly experienced seamen in our profession, will tell you that the ship was not designed as an ironclad at all, that she is a special vessel of war for cruising in distant regions, protected at the water-line and other places; never intended to be reckoned as an ironclad, but intended to protect our commerce wherever that commerce may be, and to meet any unarmoured vessel not only on equal terms, but on terms that will ensure victory. The "Shannon," with her co-mates, was not designed as an ironclad, and does not rank as an ironclad at all, because they are cruisers with an armoured belt at the water-line. That does not show that they are in the least intended to take the place of an ironclad warship; nor can such a type of vessel, in my opinion, ever by any means take the place of an ironclad on equal terms when she has to engage another. The various remarks that the Essayist has made about circular ships I must leave others to deal with. Of this I am perfectly sure, the circular ship presents very remarkable features for special and

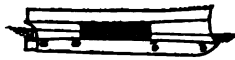
limited purposes. The circular ship is being studied by those naval architects and constructors who are perfectly capable of dealing with the question in every way, both in its practical construction and as to the scientific requirements which every vessel that floats on the sea ought to have. Therefore, as I am not in a position to go into these details, having occupied your attention far too long, I shall say no more upon that subject. I will not allude further to the sailing and unarmoured cruisers, for it does not appear to me, on reading the Essay carefully, that there is suggested anything remarkably new. He has not suggested any new type; and with the exception of certain details which are extremely well thought out, and which after all are being carried out more or less successfully in every new ship, the whole marrow, pith, and kernel of this essay is the new type of ironclad to engage the enemy's ironclads. I think I have given this meeting sufficient reasons for not believing that that new type ought to be adopted. However great the merit, and however much we may be indebted to the gallant officer for his production, I believe that we cannot be wrong in decidedly (as I have done) condemning the new type as an ironclad vessel of war able to contend with other ironclad types. I hope in the remarks I have made that I have strictly guarded myself from saying anything which might appear offensive, or calculated to give pain to any one, but if I should have done so, as I said at the beginning, I should wish to apologise for it, and to say again that nothing could be further from my wishes or intentions. I beg to thank you for the attention with which you have listened to me, and now bring my remarks to an end.

Mr. BAENARY, Director of Naval Construction: The matter discussed in the paper is so extremely important that I trust you will not be tired if I speak for ten minutes or a quarter of an hour on the subject. I find that the ships which have been put forward of new types by Captain Noel would cost about 21 millions of money, and I suppose, therefore, we ought to be prepared to discuss pretty fully his plans before we go so far as to condemn that which we have already, and agree to enter upon so large an expenditure of public money. The ten first-class ironclads which he proposes would cost about 4½ millions, the twenty second-class would cost about 6 millions, and the four coast defence ships would cost about 3 millions. The six of the second class of coast defence would cost about 3 millions more, making altogether forty ironclad ships, at a total of 16½ millions; and then there are besides twenty-four cruising ships, costing 4½ millions, making altogether 21 millions. Sir Spencer Robinson has said already enough about the "Devastation" to justify me, I think, in saying nothing about her, although I proposed to commence my observations by some remarks about what Captain Noel calls "coast defence ships." I must confess I was astonished beyond measure to find reckoned with those coast defence ships not only the "Thunderer" and "Devastation," but also the "Dreadnought" and the "Inflexible." The "Dreadnought" is a ship with a belt of armour rising everywhere 4 feet out of the water, with a deck running right fore and aft 11 feet out of the water, with 14 inches of armour and 14 knots speed, and with a draught of water that puts her altogether out of the list of coast defence ships. Why she should be reckoned among coast defence ships, and considered not to be a first-class fighting ship, I cannot imagine. I can understand why he excludes the "Inflexible"—he does not believe in her. If you would give me a minute or two, I think I can show you what it is he fails to understand, because it is really very easy to be understood. I cannot conceive exactly what his language is meant to imply any more than Sir Spencer Robinson can, but I think I see enough of what he means to show you where his error lies. Suppose this central part of a ship (Fig. 1) is an armoured part, and these two ends are not armoured, but that underneath these two ends—that is, under the water-line—there is a shot-

Fig. 1.



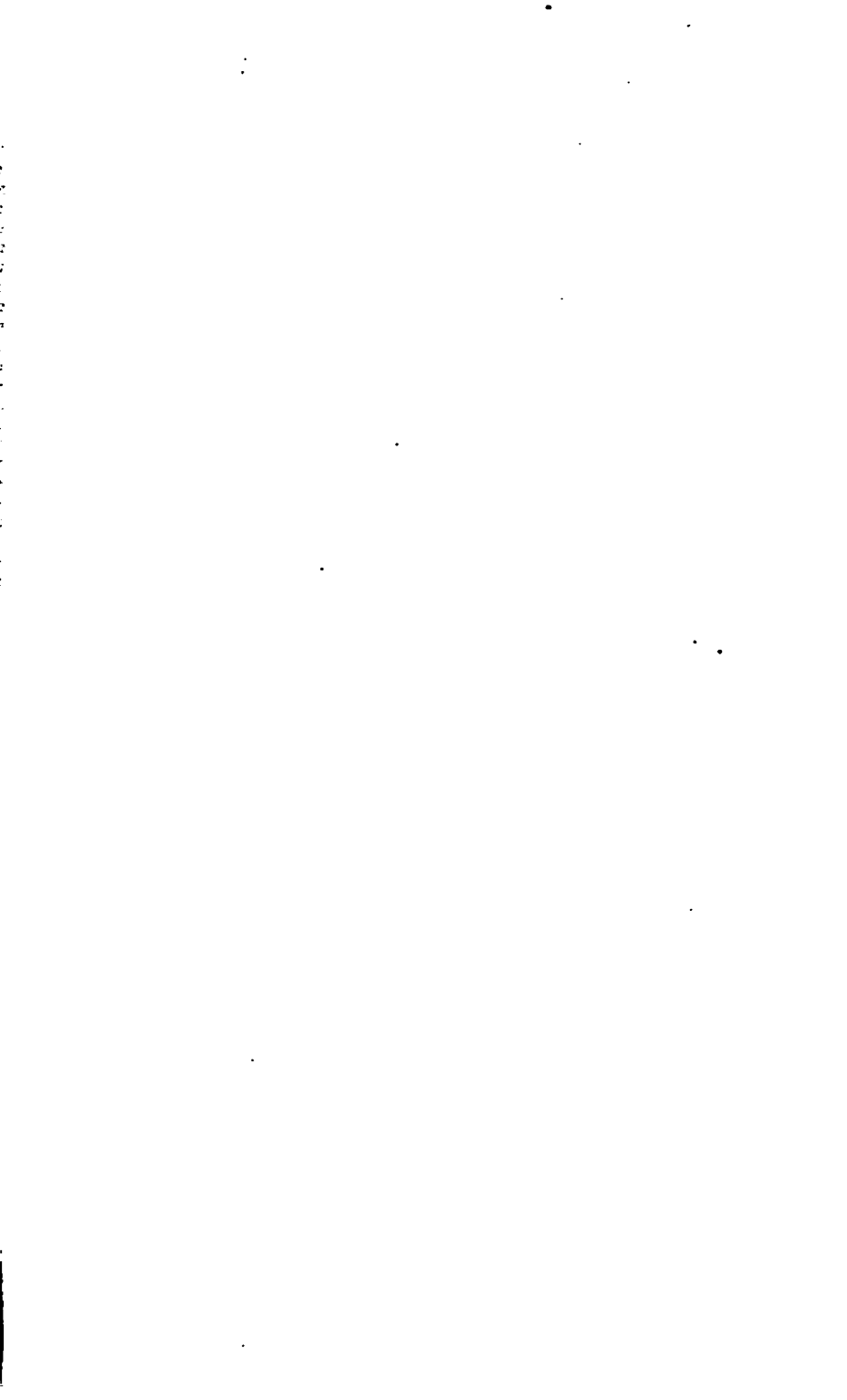
Fig. 2.



proof deck. Now look at her the other way (Fig. 2). Taking the upper deck of the

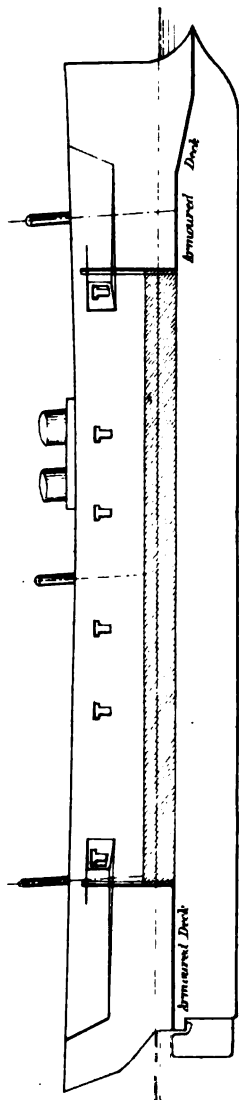
ship 20 feet out of the water, and the fighting-deck 10 feet out of the water, the armour goes up to the fighting-deck and comes down under the water; and there is a shot-proof deck continued under the water in both directions towards the stern, *a a*, and towards the bow, *b b*. If she were light and had not her proper allowance of coal, this shot-proof deck would be 4 feet under the water, and the fighting-deck would be 12 feet out of the water. You will see that the areas of these two parts are together nearly the same as the area of the centre part. Imagine now that you have perforated this thin plating, and filled the two ends of the ship between the shot-proof decks and the water-line with water. Suppose, in other words, that these spaces are quite empty, and that when you let the shot come in they get filled with water. Now, says Captain Noel, there is nothing to hold the ship up, except the part under the shot-proof decks. What he means by that I do not know. What is obvious is this: inasmuch as you have lost the buoyancy which is due to a body of a certain area, 4 feet thick, you may take this central body, which is armour-plated, of the same area, and if you take a layer of that 4 feet thick, it is quite obvious if that 4 feet goes down into the water you have done all that nature asks you to do. The buoyancy has been lost of the 4 feet abaft the citadel and the 4 feet before the citadel, and she asks you to give up 4 feet more, *i.e.*, an equivalent bulk of the unpierced part of the ship not previously immersed, and what you will have now is a ship with a fighting-deck 8 feet out of the water, and with a shot-proof deck 8 feet under the water, instead of that which you started with, *viz.*, a light ship with the fighting-deck 12 feet out of the water, and a shot-proof deck 4 feet under water. But this is not the actual ship. The ship is this. Let me ask you to imagine now that she is, as she might be, loaded with her stores; the fighting deck would then be 10 feet out of the water; she has been pushed down 2 feet, and the shot-proof deck is 6 feet under the water. Suppose, first, that this 6 feet under the water had been filled in solid with timber. Now will you tell me what will happen when I shoot into it? Why should the ship sink? All that will happen will be that so far as the shot ploughs a hole into the solid timber so far a small quantity of water will go in, but only to fill up the hole actually made by the shot. But you say, "The 'Inflexible' has not got a bow filled in with timber like that." No, but she is filled in with something which excludes water three-fourths as well as timber does; she is filled with fuel there, and if the ship is filled with fuel, in sea-going trim she is brought down in the condition you see, and she excludes water, even although you punch shot through her from one end to the other of those two places. Or suppose, on the other hand, she were perfectly light and there were no divisions—I need hardly tell you the whole of the unarmoured part is divided into numerous compartments at both ends—but even supposing the ship were light, and there were no fuel and no divisions, then after perforation of both ends, instead of having a ship with 10 feet height of battery out of water, you would still have your ship at the very least with 8 feet out of water. What is there incomprehensible in that? What can Captain Noel mean by saying that the ship's safety depends on the part under the shot-proof decks keeping out the water? It is the armoured citadel that keeps her up to the surface, and the fact that the unarmoured ends of the ship are filled in with fuel, and exclude the water.

Now one word about cruising ships. Some tables are given about the exact weight of the armour of the belted cruising ships. Perhaps you will take my word for what I am going to say—I can prove it if it is necessary—it is that Captain Noel has made a curious error. I do not know precisely whether it is that he has omitted to multiply by two, but I think that is what it is; at any rate the weights of armour he has given here are, taking the least estimate you can, half what they ought to be. Take page 15. Any one who will multiply 300 feet by 2 for the two sides of the ship, and will multiply that by 8 for the width of the belt, and will multiply then by $4\frac{1}{2}$, that being the average thickness of the armour, then by 40, that being the weight of a square foot of 1-inch plate iron, and will then divide by 2,240, will discover that instead of having 202 tons, he has about 410 tons. I do not think it quite fair to us to give us, as the design for a ship, no other particulars as to weight than these. I am therefore obliged to pass from his belted cruisers with this remark, that I think Admiral Stewart would call that (pointing to a model of the "Nelson" and "Northampton") our belted cruiser. We have not used the name, but Sir Spencer Robinson has already said the "Nelson" and "Northamp-

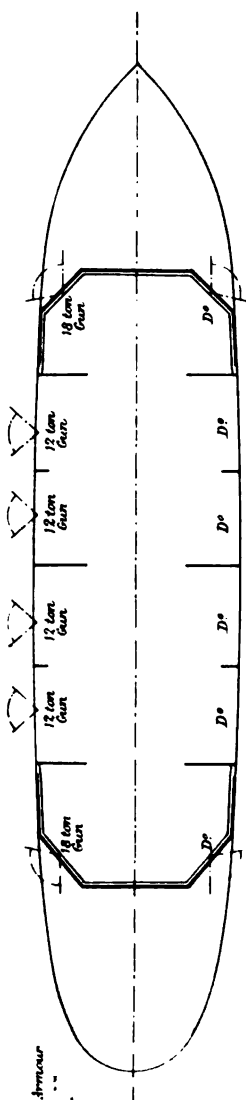


NELSON & NORTHAMPTON.

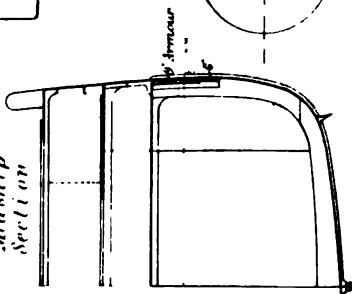
Profile



Plan of Gun Deck



Midship Section



ton," which is in fact very much the same as was described in this room three years ago, and of which there is a drawing furnished by me in the XVIIth Volume of the *Journal* for 1873, agrees pretty nearly with the ship proposed by Captain Noel for his first-class battle ship. Those ships ("Nelson" and "Northampton,") are in fact very much the same size as what he calls his first-class battle ship, but they have only 9 inches of armour, whereas for his first-class battle ship he proposes to put 14 inches. They differ from his ship in that they have no belt armour at the ends. He proposes, as Sir Spencer Robinson has told you, to make his belt armour at the stern only 2 inches thick. We do not like 2-inch armour at the ends if we can get rid of it, and so what we have done is to put at the two ends of the ship stores and fuel, which will exclude water, even if perforated; but in the "Nelson" and "Northampton" you find at the stern you get 9 inches of armour, at the bow 9 inches, and anywhere along the belt the same thing. They differ from his ship also in this, that the guns are protected from bow fire by 9 inches of armour across the bow. The belt is one foot narrower than his belt; the armour 9 inches thick instead of 14; the displacement of the ship 7,300 tons, whereas the displacement which he puts down for his is 7,500 tons; the ships are therefore about the same size. But he says he only wants 700 tons of armour for his ship, which is for the line-of-battle: the "Nelson" and "Northampton" carry 1,700 tons, and they are only belted cruisers.

SIR SPENCER ROBINSON: Is there side armour?

MR. BARNABY: Side armour to the bow guns and to the stern guns. The armament is two 18-ton guns firing astern and on the broadside, and two firing ahead and on the broadside. There is therefore a broadside battery of two 18-ton guns, protected by 9 inches of armour on each side, and the intermediate guns are 12½ tons. The midship part is unarmoured, and I am in the unfortunate position that I am committed to some extent to the same idea as that of Captain Noel, which has been handled so roughly by Sir Spencer Robinson. All I say is, whatever can be said for Captain Noel's ship may be said much more strongly for the "Nelson" and "Northampton." His second-class ironclad is only to have about the same thickness of armour as these ships have, but what I have told you about the armour will be sufficient to show you that you cannot place any reliance upon the figures you find there. It is my duty to say that, and I say it, but you will understand that an officer in Captain Noel's position cannot be where he would have an opportunity of going as carefully into a matter of this kind as we should have in London. It takes all my time, by night and by day, to make myself master of the details of my profession, and I am not in the least surprised that he, clever sailor as he is, trips sometimes when he comes upon our ground.

SIR SPENCER ROBINSON: Are the broadside guns to be on turntables?

MR. BARNABY: No; the idea is that the only protected guns are to be these four 18-ton guns. If this ship is engaged in close action with an ironclad, which she may have to be, although she is not designed as a battle-ship, then naval officers know how these guns may be laid and fired in a broadside without exposing all the gunners necessarily, either on one side or the other, to the enemy in passing. There is a magnificent bow-fire from behind 9 inches of armour; there is also a magnificent stern fire, and you will see Captain Noel gives no protection whatever against stern fire. And if it should happen that this ship has to engage an ironclad, these four midship unarmoured guns can be laid, and you can place yourselves in a position where your enemy cannot get at you, and fire them in a broadside. You get therefore the advantage of a large number of guns for which he contends; you get your isolated batteries which, though Sir Spencer Robinson does not seem to approve of, is to my mind undoubtedly an advantage. Inasmuch as the bursting of a shell in a single battery may be serious, the splitting up of the guns into several batteries commends itself certainly to my judgment. The cost of the hull and engines of one of these ships is £330,000; and I should like to say in that connection another word about coast-defence ships. £330,000 is the sum of money which it appears from Captain Noel the Russians have paid for the "Novgorod," and he seems to consider the "Novgorod," which mounts two 23-ton guns, is a ship to be commended, having cost £330,000, and he comes here to say that he thinks we should build ships, not of 2,500 tons,

but of 8,500 tons of the same kind. These ships would cost three-quarters of a million of money each. I would say with regard to the "Novgorod," which he says cost £230,000, you shall have twenty gunboats going nine knots an hour, carrying a 25-ton gun, for the same money. Which will you have? But Captain Noel does not contend for a "Novgorod" in the Russian style; he contends for it in Mr. Elder's form. But in Mr. Elder's form he introduces a difficulty which Admiral Popoff has avoided to a great extent. For if the things are slow, and they will be, and if they are attacked by boats that are fast, and they may be, and these boats have torpedoes, which they will have, there is a nice little shelf there under which you can put the torpedoes. With regard to the battle-ships, I only remind you that this ship, which we call a belted cruiser, makes up her 7,300 tons in this manner—2,800 tons weight of hull, 2,800 tons of engines, guns, stores, coals, 1,700 tons of armour (vertical and horizontal), and that will make 7,300 tons. Now Captain Noel tells us that this ship, with 14 inches of armour, is going to be built with about that total weight; and he is going to do it with 700 tons of armour. He is going, moreover, to put a vastly heavier armament in the ship. I think I have said enough to show that I do not altogether agree with Captain Noel.

Sir SPENCER ROBINSON: I think Mr. Barnaby misunderstood me when he said I disliked separate batteries;¹ it is the very thing of all others I like most. What I do object to is an unarmoured battery for an ironclad.

Lieutenant MERRYON, R.N.: May I be allowed to say a few words, after Captain Noel has been so roughly handled, on his behalf? I quite agree with what Sir Spencer Robinson said about the success of the "Audacious" and her class, in answer to Captain Noel's expressed opinion of them as failures. But Sir Spencer Robinson and Mr. Barnaby did not allude at all to one point in Captain Noel's Essay that I think is a very notable one, and that is, Captain Noel points out the very great inutility of bow-fire, to which so much importance has been given in most of our ironclads, at the expense of considerable loss of armour in the foremost angles of their batteries. When you consider two hostile fleets approaching each other at great speed, with the captain of each ship's nerves fully stretched to keep his station, and watching his compasses, if he is a leader of a division, to keep his course exact, so as to bring his division into contact with the enemy in as perfect a formation as possible, what would be his irritation to find a gun going off right under his nose when he least expected it, setting all his compasses swinging, and obscuring the enemy for a few most valuable moments; and, finally, the system of attack not likely to be doing any harm to the enemy at all, as the shot would be striking on, or glancing off, the thickest defended part of the enemy's ship, that is, the bow! I think too much value has been placed on this bow-fire; it is practically useless, except in the case where any of our ships might take the ground when in action with shore batteries.

Captain BEDFORD PIM, R.N., M.P.: I should like to move the adjournment of the discussion. The subject is a very important one, and the hour is now getting rather late. I beg to give notice that at the adjourned discussion I shall move the following resolution: "That this meeting is of opinion that the Essay of Commander Gerard Noel, R.N., for which the Medal of this Institution has been awarded this year (1876) bears the impress of hasty and ill-considered compilation, and does not point out the best type of war-vessels for the British Navy; letly, for combined action; 2ndly, for single cruisers of great speed; thirdly, for coast defence."

The CHAIRMAN: I must beg to inform you that it is not competent for you to bring forward such a motion in the theatre.

Captain SCOTT, R.N.: The subject before us is a very important one, and I feel strongly that we have only touched the edge of it. I think that more extended diagrams should be brought here, and that what we should discuss is the gradual development of our fleet, how it may be improved, and the direction that improve-

¹ The separation of the guns in the batteries by the traverses he has described. On the contrary, it meets my entire approbation. Something not unlike this arrangement, was made in the "Bellerophon," under Mr. Barnaby's directions. What I objected to, is classing ships with unprotected batteries as ironclad ships of the line.—R. S. R.

ment ought to take. I look upon these as points so very important that they cannot be too much ventilated. I will, therefore, second the adjournment.

Sir SPENCER ROBINSON: If the debate is adjourned, it must be upon the Prize Essay.

The CHAIRMAN: I quite agree. We must stick to our subject. There are plenty of opportunities of going into the other questions. We must understand that the adjournment is for this, and we must endeavour to keep and speak to this as much as we possibly can.

(Adjourned to the 30th inst.)

ADJOURNED DISCUSSION.

Thursday, March 30th, 1876.

ADMIRAL SIR HENRY J. CODRINGTON, K.C.B., in the Chair.

The CHAIRMAN: Before re-opening the discussion I wish to say a few words on two or three points. The first is the necessity of confining the discussion to the purpose for which the meeting was summoned, viz., the Prize Essay. It is the only way in which we can make our proceedings keep within bounds. The next is that there has been some expression about the province of those gentlemen who have been kind enough to undertake the laborious and difficult duty of umpires in deciding on the Essays of candidates for the medal. It should be well understood that those gentlemen have undertaken a certain duty, namely, to decide, out of the various Essays which have been brought before them, which is the one that they consider on the whole, after duly weighing the various merits of all, is worthy of the Gold Medal of the year. It does not at all follow that the umpires advocate any particular points in that Essay; they are merely deciding on that which they consider the best essay, in order that the Council may give the medal to its author; but they are not responsible, of course, for the particular opinions given in those essays. However, we may rely upon one thing, that the high character and long professional experience of those Officers, who have been kind enough to undertake that very difficult duty both in the case of the Army, and of the Navy medal, is sufficient warrant for us to feel well assured that they have adjudged rightly on the point on which they did judge.

The next point I wished to mention was, that an idea has been put forward by a gallant Officer about moving a resolution. We should well understand that there is no power to do anything of the sort at these meetings. We meet here—the members of this Institution, and their friends, and any gentlemen whom they invite, anybody who can give us information on the military or naval questions under discussion—and there is a free course for discussion on all these points. But we are not a general meeting of the members, nor are we in any way authorised to pass resolutions; in fact it would be illegal if any meeting of this sort were to attempt to pass resolutions.

Sir SPENCER ROBINSON: Before the discussion commences I beg leave to ask one question. You have stated,—and I am sure I am extremely obliged to you, and I should think every member present is extremely obliged to you,—the part the referees

had to take, and how far our discussion was limited by the manner in which they had discharged the function they were called upon to perform. May I ask was any naval architect consulted in awarding the merit of this essay?

The CHAIRMAN: I do not know that I am in a position to answer that question in any way. The Council invite three members, either of the Army or Navy, as the case may be, to undertake this duty, and I can assure you it is a very difficult duty indeed. In the case of the military medal there were seventy-nine Essays, and the referees with many other occupations, some official and many private, had to read those seventy-nine Essays thoroughly well through, then they had to meet and give their opinions. The naval Essays were not nearly so numerous, from whatever cause it might be, but I apprehend it is entirely in the breast of those gentlemen whether they did or did not consult any other persons. At any rate, I am not able to say.

Sir SPENCER ROBINSON: If you could have told me that a naval architect was consulted, I should have been very glad to hear it.

General SCHOMBERG, R.M.A.: I hope I shall not be considered presumptuous in venturing to speak on this subject not being a sailor, but the Officers of my branch—I won't say my brother Officers, because we either are, or ought to be, all brother Officers—may have to fight in those ships, and I naturally feel and always have felt a very great interest in their construction.

We cannot put an iron case on our own feelings and everybody who has been in office, I suppose (as I have), wishes very much he could; but however difficult it may be, I think as little personal feeling as possible should be shown in considering this very grave subject. We live in a time when there are changes almost daily in artillery. The whole system of warfare is revolutionised. Therefore, I think when a new class of ship is proposed this should not be construed into an attack on by-gone ships, which have been, perhaps, perfectly suited to by-gone times. We are proud of our mechanical powers, but I do not think we have any so perfect piece of mechanism as the old line-of-battle-ship was, to do what she had to do before the days of shell-guns and steam. We are now trying hard to get something which will do as well, and it is a very difficult task. I think, therefore, it should be a subject of gratification to the Naval Service that a young Officer in its ranks has brought forward his views on this subject with so much modesty and intelligence as Captain Noel has done.

The expressions "success" and "failure" have been used very often. We ought to qualify them with the adjective "probable," because none of the iron ships that have been yet constructed have gone through the fiery ordeal of action, and until that takes place I do not think we can talk of "success" or "failure." We can only guess, and he will be a very clever officer indeed who will prophesy what the outcome of a naval engagement will be.

I will now come to Captain Noel's proposed ship for combined action. I perfectly agree with the main principle he starts with, that looking at the great changes which have taken place in artillery, the first object to be sought for is that a man-of-war should be unsinkable, if possible. I think this is the first desideratum; and even protection to the gunners, speed, and coal-carrying power are minor points compared with it. I feel the greatest satisfaction in seeing the drawing of the "Nelson" and "Northampton," which very nearly carries out his views. I, for my part, would much rather go into action in a ship of that sort than anything we have constructed yet. I think we would all rather run the chance of being smashed than the almost certainty of being drowned like rats.

I agree with Captain Noel's opinion that the value of bow-fire has perhaps been rather over-estimated. I think when two fleets are closing (of course this is all conjecture), probably very few guns will be fired, and the fewer the better. But I also think he has disregarded protection to the bow and stern; and I would rather sacrifice some of his increased armament to get what in fortresses are called "traverses," and in ships "bulkheads," which would give a certain amount of cover from the raking fire to which ships may be exposed.

The next subject is the guns themselves. I think all those guns should be on turntables, and if they were placed on turntables I believe you need expose very few men on the gun-deck: all the traversing, and running-in and running-out, might be done

on the deck below. So that the only men who would be exposed would be No. 1 and perhaps four or five men to load, who might also be under cover when not actually engaged in serving the guns. There is also one other point Captain Noel has rather overlooked, and that is strengthening the deck that covers the boilers, powder magazine, and the men.

The proposed steering apparatus (I speak with great hesitation) seems to me rather weak.

As to the cruisers of great speed, the subject is rather off my line, but I submit that the proposed belt might probably diminish the speed under sail; in war there must be great difficulty in getting coals, and everything that takes away sailing power must be a disadvantage to a cruiser.

As to coast defence, I will not enter into the point whether the "Devastation" is more calculated for coast defence than for cruising: she is the only one of her class that has been afloat, and I think the main point of Captain Noel's objection is correct—that she seems to have too small a margin of flotation. She is perfect if she has not a hole in her skin, but what will happen if her skin be pierced no one can say.

Then I come to circular ironclads—I should be very sorry to call them "ships"—I think if you call them "circular batteries" such movable batteries might be of immense use for the defence of the Thames, Mersey, and our other rivers.

If we do not organise the defence of these rivers and hives of industry before war comes, it can never be organised when war does come, and Liverpool and other ports will be burned to a certainty.

My idea of a gunboat for the defence of the coast of England is a vessel that can take the sea in any weather and carry the heaviest guns—I do not mean the monstrosities in the way of guns we are now trying, but 35-ton guns. Such vessels as could also keep the sea and rendezvous off Beachy Head or the coast of Ireland in any weather are what we require.

There is one kind of vessel that has been entirely forgotten, and I am afraid the piece of ordnance she has to carry is also forgotten; that is, the mortar-boat. We have no 13-inch rifled mortars, and I think it is a pity that we have not, because England's power of defence rests in her power of offence, and with 13-inch rifled mortars I believe we could burn a good many arsenals and dockyards which are considered unapproachable.

Captain Noel has made a comparison of our fleet with that of other nations. Now I won't say whether such a comparison is judicious, but when a comparison is made, I think the conclusions drawn from it should be correct. In the old days of line-of-battle ships if we had 100, France 50, and Germany 30, we could attempt to draw comparisons of naval strength. A line-of-battle-ship was a unit of strength that we could perfectly understand. We knew she could only be sunk (barring the force of the elements) by a line-of-battle ship. We cannot say that now with regard to the new ironclads, which a gunboat might sink; therefore such comparisons are not correct. For this reason it is imperative that we should have a very, very large reserve of ships. In looking at Schomberg's "Chronology" before the commencement of the war of 1793, I find that, roughly, we had 129 line-of-battle ships, 129 frigates, and about 100 smaller vessels. That force was a much greater naval force than we have now. This subject, reserve of ships, is one that requires very grave consideration.

Captain R. A. E. SCOTT, R.N.: General Schomberg has just spoken of comparisons, but it is exceedingly difficult to institute any satisfactory comparison.

Unless England can maintain her maritime superiority she must cease to be a great power amongst nations; therefore, what she wants is, first, the maximum of efficiency in her armaments, and, secondly, the minimum of cost.

I find at page 16 of Captain Noel's pamphlet, great prominence is given to the arming of ocean mail steamers as a sort of supplement to our naval force in time of war. I think any such expedient would come too late; it would be a similar mistake to that made at the commencement of the Crimean War, when, instead of utilising the steam tugs by at once preparing them as gunboats, it was unfortunately decided to build gunboats, and we all know with what result. Now things march on a great deal faster than at that time, and unless we are thoroughly ready when war breaks out, we could not afterwards recover the lost ground.

England, as a first necessity, must be prepared to maintain her lines of traffic with India and her colonies unbroken, and this can only be done, *not*, as some have supposed, by removing our merchant steamers from their legitimate trade, but by preserving this trade by rendering our merchant navy which carries it, a navy militant, by giving them a thorough and intelligent training in times of peace.

It is necessary I should refer to this matter, because when one speaks as to what class of cruiser is the most needed, one has to bear in mind what cruisers have to do, or rather, as I hold, what our war cruisers must supplement, which is our *armed Mercantile Marine*.

This force, kept fully manned by its own crews, is essential to preserve our commerce, which must furnish the sinews of war.

Once interrupt our trade by taking away from the merchant steamers their able seamen who are now the Royal Navy Reserve men, and you would destroy your own resources.¹

The Reserve men must be retained in our merchant vessels, their (Reserve) Captains commanding them, and thus keep their own ships really prepared at all times to meet an enemy's flying cruisers or privateers.

Remember what Raleigh, Drake, and others did of old. How they in poor vessels were a terror to Spain. Look at what our sailors did in many a cutting-out exploit, and are not our British seamen able to do the same now? Let every passenger ship, then, be prepared to defend herself, her passengers being armed with Snider muskets and the sailors provided with light guns, torpedoes, and Gatlings, and thus you have at once your first line of defence—a line which must be maintained at all hazards unbroken. If our foreign trade were to be interrupted, England would soon be left without commerce.

A great deal has been said about the desirability for the multiplication of lightly armed British cruisers, but our cruisers must constitute a strong sea police, and be prepared efficiently to support and protect our Mercantile Marine against capture by real war ships.

We may talk of fighting in squadrons, or in any other settled manner, but that would probably not be the way in which an enemy would attack us. For instance, if we were prepared with very heavy vessels to fight only in the Mediterranean, that is not where the enemy would go, but he would instead send his powerful ships to distant seas, and attack us there. In that case if our cruisers were weakly armed vessels² of what use would they be? Are they to run away from every small or seeming ironclad? Certainly not. They must remain and fight to protect our mercantile lines of traffic, keeping up constant communication with each other, so that if any point in these lines is menaced, it may be made known and defended by a sufficient force.

Captain Noel speaks of having the cruisers, proposed in his Essay, *belted*. The "Nelson" and "Northampton" are belted ironclad cruisers. The question now in dispute seems to be, whether our cruisers are to be really efficient for fighting purposes, or to carry small guns only at a high speed. I think a lightly armed cruiser would be of little use in warfare, for our merchant vessels could give a good account of privateers who would find they had caught tartars if these were handled as they ought to, and I expect would be, by well trained Reserve seamen, commanded by well trained Reserve merchant captains.

Granted this, and it will then be only necessary for our cruisers to be equipped to fight with actual men-of-war; hence we should build cruisers of sufficient size and power to be useful in all seas and under all circumstances. The question therefore arises as to what, on the whole, will be the most efficient and economical vessels for such services.

The "Nelson" and "Northampton" in some respects meet our naval require-

¹ On the declaration of war it would, I believe, be necessary for Government to give a guarantee for the payment of the excess of insurance caused by hostilities, so as to prevent English goods from being carried by neutrals.—R. A. E. S.

² The "Iris" and "Mercury," of large size and enormous speed, will only carry 64-pounders into action.—R. A. E. S.

ments. They are belted cruisers, and men's minds are going in the direction of putting some armour on cruisers.

Sir Spencer Robinson told you at the last meeting in this theatre how the thin sides of an unarmoured vessel built of iron would be driven in by shot, and be cleared after a few rounds with shell, leaving her a mere wreck. I think therefore that this serious disadvantage should be well weighed, for England's cruisers should be ready to fight any foes they might chance to meet. Much difficulty is necessarily experienced by our constructors in trying to keep in advance of the times, and to make their ships so perfect as to meet every possible requirement of present or of future warfare.

What at present is required for naval warfare is an important problem. Commencing with weapons of offence, we doubtless want the ram, the torpedo, and the guns. Every cruiser should, as Captain Noel proposes, be a ram, and should carry torpedoes; then as to guns, it is of no use to provide her with guns that won't penetrate anything and everything she is likely to engage in distant seas; and therefore I take as the smallest gun which would be really effective against the present thicknesses of armour to be a gun of 18 tons.

The "Nelson" and "Northampton" are to mount four unprotected 12-ton guns and 2 protected 18-ton guns on each broadside. I think if the armour had been shortened they might have carried, in lieu of the four unprotected 12-ton guns, two protected 18-ton guns, and then if wished they could have also mounted two more 18-ton guns outside the shelter of the armour. To give a better idea of what I think a cruiser's armament should be, I will take one of the existing types, viz., the "Raleigh," a vessel of about the right size for a cruiser, but which is now armed with *shell* guns on the broadside, without a single plate-piercing gun amongst them. These weapons consist of 64-pounders, and what were efficient 6½-ton guns, but are now turned down to 4½-ton. The "Raleigh" has also one 12-ton revolving gun forward, and one 12-ton revolving gun aft. The weight of her guns is, I believe, 181 tons, and of her powder and shot, 255 tons, giving a total of 436 tons. Now the "Raleigh" could have mounted two 18-ton revolving guns on the upper deck, one forward and one aft, and used the same small rear turn-tables as those by which her two present 12-ton guns are worked. She could have had two 18-ton guns upon each broadside worked rapidly by means of similar small turntables, and have also carried a useful proportion of lighter guns. I hold that no ship should be armed with only heavy ordnance, for without a proportion of light and quick working guns she is liable to be destroyed by the attack of torpedo boats. The "Raleigh" could have mounted, in addition to six 18-ton guns, four powerful 64-pounder breech-loading guns—firing large charges of powder with steel shell (which would pierce ordinary armour), and also with the destructive double shell. In addition to these guns, she could have mounted four breech-loading anti-torpedo 20-pounders (giving very great elevation and depression), which would altogether make about 180 tons, instead of the 181 tons of her present guns. The supply of powder and projectiles would weigh about 218 tons, giving a total of 398 tons, so that the "Raleigh" could have been locally strengthened, and been then given a most powerful armament well adapted for all the purposes of warfare, in lieu of the inefficient armament she now carries, and without any increase of weight.

I think it is a great mistake to say, as some have recently done, that effective fire can only be delivered on the broadside.¹ A war vessel should be prepared to fight an enemy ahead, or to fight an enemy astern; in fact, the man-of-war should be prepared to fight at any and at all points; and she should be so armed as in any position to be able to bring the greater number of her guns to bear in every direction. Take the "Raleigh" as I have proposed, she should be armed as an example of what might be done; she would have been able to fire three of the six 18-ton guns from ahead to 15° abaft the beam, and the other three from astern to 15° before the beam, the bow guns and the stern guns crossing each other's fire.

¹ The service ogival-headed projectiles will not bite in armour beyond about 33° from the perpendicular: flat-headed projectiles will bite at nearly double that angle. The former being of cast-iron, are liable to break up; the latter being of steel are much tougher.—R. A. E. S.

On the broadside she could have discharged four 18-ton guns—the two broadside guns commanding a range from across the bow and stern respectively to 75° training in the opposite direction, or a total range of 167° for each gun; so that, excluding the lighter guns, which have wide arcs of training, the “Raleigh” would have been able to fire a broadside from four 18-ton guns, at any enemy, from 15° before to 15° abaft the beam; and to fire three 18-ton guns in any other direction, either ahead or astern. I think, however, that our future cruisers of the “Raleigh” class—but with more beam and a flatter floor, must be armour-plated. A proposal was made by an admiral to put on an inch of plating, but an inch of plating would be useless; it might break up our own weak cast-iron shell, but it would not break up the steel shell that Brazil and other naval powers are giving their vessels. I think there is no doubt but that all projectiles used in naval warfare will hereafter be steel *shell*, whether intended to be fired against armour-plated ships or for any other service, because such projectiles would be efficient under all the conditions of warfare.

The “Northampton” and “Nelson,” with their rudders well under water, and their many water-tight compartments, have great advantages as cruisers; they have also two inches of iron deck to protect their boilers, and likewise traverses on the gun-deck to separate the guns. These ought always to be shut off one from the other, so that a shell bursting over one gun would not thereby disable the adjoining gun. There is a further consideration, namely, that when you come to armour-plate cruisers, whether such vessels will be able to move quickly and to tack under canvas. My own belief is that they will not; and I look forward to the time when the present heavy masts and sails will be done away with.¹

The weight of the “Nelson” and “Northampton’s” three masts, gear, and sails will probably be between 200 and 300 tons; take these away and throw their weight into coals, and see what an advantage you would gain. You would remove the top hamper, and give far greater speed going head to wind.

It would be a most interesting experiment to take a ship of the “Audacious” class, with a single lifting screw and sail power, and to keep her out for a certain time, trying her in every possible way against another vessel of the same class, but fitted with double screws, and having her masts taken away, and their weight added in coals.

The mistake often made is to suppose that cruisers are constantly to be steaming at great speed, whereas the fact is that these watchers over our commerce in time of war would usually be going at a very slow speed, and burning very little coal. If sailing power be dispensed with, the important question of coaling at sea becomes prominent. I believe it could be done, but numerous coaling stations and other needful arrangements should be at once prepared, and not left until we come to actual warfare.

I will now leave the question as to the best description of cruiser, for I think I have shown that the future British cruiser should be an ironclad, in fact, all our future powerful foreign service-vessels should, in my opinion, be armour-plated; and I think if we were to thoroughly re-arrange the armaments of our present ironclads, and to utilise them as cruisers, we should have a very formidable navy for ocean warfare.

Lately one of the “Minotaur” class had her main deck broadside ports enlarged at great expense merely to put 12-ton guns in them. For the same cost four 38-ton guns could have been mounted upon her *upper* deck, and thus have made her an efficient war vessel.

Here is a large ironclad that cannot turn quickly, and therefore the very vessel that ought not to be re-armed merely for broadside fighting; and yet the ports of this vessel were enlarged to mount comparatively inefficient guns, which can only be trained to fire on the broadside, instead of putting very much more powerful guns upon the upper deck, where they (the 38-ton guns) could have been mounted so as to have commanded the whole circle of the horizon.

¹ Short masts to carry triesails to steady the ships in a gale, and to give a better draught to the engines in warm weather, and also to carry square sails when running free, are desirable.—R. A. E. S.

I do not, however, mean to compare this vessel with our modern ironclads, but I am showing how ships of this type could be rendered efficient.

During the time I was at the Admiralty, these matters were continually debated; and Sir Spencer Robinson and the Constructors, who always supported a policy of progress, and pushed forward the development of our armaments, know the very great difficulties that there are in the way of carrying out all such improvements.

The only other vessels I wish to advert to are coast defence vessels.

I think it is the greatest possible mistake for England to possess ironclads that are not sea-going. I know the contrary has been and is still insisted upon, and that small ironclads have been consequently built for coast defence.¹ I believe that what we want for coast defence are vessels of as shallow a draught as possible; and experience has shown us that we should build our vessels with a flatter floor and greater beam, which would give more floating power with little loss of speed.

General Schomberg has said, and you will doubtless concur in his view, that our gunboats should be vessels capable of mounting 35 or 38-ton guns, and be able to go anywhere round our coasts in order to assemble at any required point.

I would supplement these powerful gunboats by taking the river and coasting steamers and making them torpedo vessels.

Then in time of war, look what a numerous musquito fleet you would have, and how valuable such a fast fleet would be! Enter their captains and crews now as Reserve Seamen, and do not waste the present time in inaction, but use it in judicious preparation. Instead of keeping the captains of merchant steamers in the grade of Lieutenants of Reserve, let them rise to be Captains of our Reserve forces.

I must not here refer at length to the merchant seamen who form so important an element of our maritime strength. We have recently had discussions in this theatre as to maintaining a sufficient supply of British seamen, but it seems to me that in the plans of taking seamen from the mercantile marine in war time to supply the Navy, and in the other proposals made, we are merely groping on the threshold of the matter, at which lies the root of England's maritime strength. To maintain this intact, we must first of all have a very large Reserve; at the present time we have none, and there are no arrangements yet made as to how to man and to maintain the large force of drilled men which will be required for our ships during war.

Until these arrangements are laid down we cannot proceed satisfactorily in ship-building; for different guns and simpler means for working them will be required with unskilled seamen. With such crews we certainly could not attain to those results which England must achieve if she wants to keep at the head of nations, and to maintain intact her maritime superiority, and with it her enormous commercial wealth.

Captain J. C. WILSON, R.N.: It was not my intention originally to have spoken on this subject at all, but during the last discussion it struck me that the set of criticism was rather going against the gallant young officer who wrote this very excellent Essay, and who has received from this Institution its Gold Medal. I am one of those who think that his essay is excellent in itself, that the principles he has laid down are clear and distinct, and that whatever its merits or demerits may be, he has chalked out for us what was in itself a very difficult thing to do; he has tracked out for us a line where there was no track before, and one which we can now follow. I think anyone who writes on this subject hereafter, may possibly improve upon the essay, because they will have something to guide them, but we must remember when Captain Noel wrote this Essay, he had nothing whatever to guide him, he had to chalk out his own line, and I think he has done so very ably. We must remember that this subject is not dealing with the type of ships that we have in the Navy at the present time, not with what we are to do with the ships that we have, but the question is the "best type of war vessels for the British Navy," and I think I may add without being wrong, "for the future," not for the past. Now, the most telling criticism on this paper has undoubtedly been that of Sir Spencer Robinson. Sir Spencer Robinson, we all know, is on this question perhaps not only the first

¹ These might be converted into sea-keeping ships at small expense.—R. A. E. S.

man in England, but the first man in the world, and therefore I think it says a great deal for Captain Noel's paper, that it should have drawn such a very valuable critic as the late Controller: but I think Sir Spencer Robinson's criticisms are more confined to a defence of the ships which he had himself something to do with designing, than to the suggestions which are brought forward by Captain Noel. Sir Spencer Robinson evidently was much offended because this young officer spoke of certain types of ships now in the Navy as being "failures."

SIR SPENCER ROBINSON: Upon my word and honour, that is the last and most impossible thing that could have crossed my mind, to take offence at anything that is written there.

Captain WILSON: If I have said anything that is too strong, I regret it; what I mean to say, you criticised very strongly the statement that these ships were "failures"; indeed I think you had very good reason, because I do not think the bulk of officers of the Navy would venture to call such magnificent ships as we now have in the fleet, "failures."

SIR SPENCER ROBINSON: I found that in the pamphlet.

Captain WILSON: Will you allow me to correct you. I think you have made a slight error. You gave us to understand that Captain Noel condemned, not only vessels of the "Audacious" class, but the "Sultan" and other vessels of her class, which he does not do, with all due deference to you. He says:—"The second class represented in the above mentioned article, includes the 'Audacious,' and her five sister ships, and the 'Monarch' as a sea-going turret-ship. The first six of those, though powerful vessels, are generally considered failures." That is to say, the first six ships, meaning the ships of the "Audacious" type. I do not think the bulk of my brother officers would venture to call even these ships failures; but Sir Spencer Robinson told us here that a mistake had been made in these vessels—he called it a slight mistake. The slight mistake of course is gaged exactly by the amount of iron concrete ballast which had been put into their double bottoms, and the amount of sail-power which had to be reduced, and that there is still a tendency to reduce the sail-power in these ships, and other ships, of a superior type, we see from time to time; only two days ago I observed in the *Times* that the "Sultan" was to have her mizen-mast taken out of her, the upper spars reduced, and to be rigged as a barque; I think that shews conclusively there was a mistake, and although Captain Noel had hardly reason for his statement that they were "failures," still there was at least a slight mistake in them; they did not come up to the standard which they were intended to reach when designed. I wish to say, I, for one, entirely approve of the great principle which underlies the whole of this Essay. That principle is this, and it was very ably put by my friend General Schomberg, the vitals of a ship ought to be protected as much as possible, and that it is a secondary consideration altogether whether the battery is covered or not; that after the vitals of the ship, the water-line, the magazines, the engines and the steering gear have been thoroughly protected, the next consideration is the amount of gun-power you are to carry on your decks, and in that I quite agree. I would rather go into action with another ship, ton for ton the same size as my own, my ship made as far as possible unsinkable, but with extra guns on my decks rather than have the weight in comparatively thin plates on my sides. Such is my view of the question, and I think Captain Noel is right in the great principle which underlies the whole of his Essay. I think his proposed ship fails in matters of detail. I do not think his details are as good as they might be. I quite agree with Mr. Barnaby, and believe that he is right, and that Captain Noel's calculations are wrong. I also go with Mr. Barnaby in preferring his ship, the "Northampton," or the "Nelson," to the ship proposed by Captain Noel; but the principle is the same in both cases. I do not think Captain Noel claims any originality of design. The object of the Essay was not originality particularly, but to write the best Essay upon the style of ships that were thought best, and I think he has done good service in drawing attention to the advantages of these ships. Sir Spencer Robinson in vindicating his own style of ships, what we may call the "covered battery ships," described a very harrowing scene as likely to occur when the uncovered battery ship went into action and received a broadside from an enemy with a covered battery at 1,200 yards,—how the main-deck would become a shambles, how the guns would be dismounted, and the

ship have to run away. We all know the inaccuracy of fire at sea, and we also know that not 50 per cent. of the shot fired from a ship, even in fine weather, would strike at 1,200 yards. Now take into consideration that the men who are firing the guns have nerves, in addition, the motion of the ship, and I do not think there is any great chance of more than 25 per cent., that is to say, one out of four or five shots striking the ship at all, and as to striking the battery it is a great chance if any does. Therefore, I think the damage anticipated in that way was much exaggerated. Now I take the case of the uncovered-battery ship. She has passed inside this magic circle—she has run through the 1,200 yards, has got inside of a 1,000, and opened fire upon her enemy with a covered battery, the ship with the uncovered battery carrying at least two or four guns more than the one with the covered battery. I say, whenever she gets within the magic circle, the number of her guns will tell, and not only will they tell, but they will tell most destructively against the thin armour which covers the battery of her opponent, and in less than half an hour she will knock her into a cocked-hat. As to the cruisers I again think Captain Noel is right. I will not enter into the details. The details in these questions are matters for the naval architects; but I think the principle is correct—protect the vitals of the ship, give her as much gun-power as you can, as much sail-power as you can, and then you have a good cruising ship. I disagree with Captain Scott about the weight of metal she should carry. I do not think it is a good thing to have no large guns; I think he puts the size of his large guns too high; but I speak with all due deference to him. I would rather have more 12-ton, or even smaller guns, than have a very few 18-ton guns. I prefer number to calibre if of sufficient power. I also disagree with him in that he prefers a ship being mastless. Where are you going to get your coals? Where are your coal depôts? When your coal is consumed, how are you going to replenish? Why, it would take half the Fleet to convoy your colliers alone. No, you must be dependent upon something which will never be used up, you must be dependent upon your sail-power. Now we go on to the "Devastation" class, and here also I would like to say one word. Captain Noel says he does not like the "Devastation" class of vessel, but he also raises certain objections to them. Sir Spencer Robinson, however, gave us a very interesting little nursery rhyme the other day about "the reason why I cannot tell, and Dr. Fell," &c., but I might also quote very much the same sort of thing about "doctors differing," &c., I think we certainly see there is a good deal of difference of opinion between Sir Spencer Robinson and Mr. Barnaby, on this very question of covered and uncovered batteries.

Sir SPENCER ROBINSON: I beg leave to say you must have misunderstood me. I have no difference of opinion whatever. On the opinion expressed by Mr. Barnaby as to the uncovered battery of that ship, the "Northampton," I agree with him entirely.

Captain WILSON: I was certainly under the impression that you were not quite unanimous in your opinions.

Sir SPENCER ROBINSON: Perhaps, if you will allow me to say so, I think the way you have fallen into your mistake is this. I do not think the "Northampton" is to be classed as an ironclad fighting ship, but as a belted cruiser she is exactly the class of ship that I think ought to exist.

Admiral HUSTON STEWART: The "Nelson" and "Northampton" were not designed as line-of-battle ships; exactly the contrary, and they appear in the Parliamentary programme as protected cruisers. It was never intended that they should appear in the line-of-battle in any way.

Captain WILSON: I am speaking of them as recommended by Captain Noel. I only referred to the "Northampton" class as ships I prefer to those he suggested. With regard to vessels of the "Devastation" class, I think they are very formidable ships, but I do not think when the question was brought up here, and they were referred to by the Constructor of the Navy, that he explained away the objections which Captain Noel advanced to the "Devastation." If his objections are explained away, I think there can be little said which is not in favour of such ships for special purposes. The only thing I have not touched on now are the coast defence vessels. There, I think, in principle, he is again right, though his details may be wrong. Mr. Barnaby very clearly showed us the other day, that circular ships of

the dimensions proposed would be too expensive, and his argument that you could get a very large number of gunboats for the same money was conclusive against them, still I think there are circumstances in which such circular vessels would be useful and even necessary, such as at the mouth of the Thames, the Mersey, and other places, where they would be infinitely preferable to stationary forts. For coast defence generally, I do not think they would be so good as thoroughly efficient gunboats. I will conclude by observing that I consider this Institution is really very much indebted to Captain Noel for his Essay, which I think is worthy of him; still I hope he may yet, after this discussion and the hints which he may gain from it, look over his paper and re-write it for our general benefit, and thus produce something even better than the original for which the Gold Medal was awarded.

Captain BEDFORD PIM, R.N., M.P.: When the meeting was adjourned last Monday, I thought it my duty to give notice that I should move on this occasion, a certain resolution to the effect "that this meeting is of opinion that the Essay of Commander Gerard H. U. Noel, R.N., for which the medal of this Institution has been awarded "this year (1876) bears the impress of hasty and ill-considered compilation, and does "not point out the best type of war-vessel for the British Navy, 1st, for combined "action; 2nd, for single cruisers of great speed; 3rd, for coast defence." At the time I gave notice I was not aware that Captain Noel was out of the country, and to press such a resolution would be extremely ungenerous in his absence. I simply wish to make the explanation why I do not now bring forward my motion.

Captain WILSON: It would not have been allowed even if Captain Noel had been present.

The CHAIRMAN: Captain Pim did not hear the observations I made at the commencement of the meeting as he was not then present, therefore, he is not aware that we are not here in a position to pass resolutions. We are simply here to discuss certain naval or military questions which are brought before us, and it would be positively illegal to move or carry a resolution.

Captain PIM: I suppose it is quite competent for me to say, as a life member in this society, that I entirely demur to the ruling of the Chairman.

General Sir WILLIAM CODRINGTON: I think I may rise to a question of order: it is not only the ruling of the Chairman, it is the ruling of the Council.

Captain PIM: I am a life member of the Institution and flatter myself I know something about the rules and regulations, and still, although it may be the ruling of the Council, I feel exactly the same, because we are met here on this occasion to discuss an Essay upon a subject, which, as I consider, is of vital importance to this country. I look upon this Institution as the first of its sort in the whole world, and this Prize Essay will go out to the whole world and it will be taken in all parts of the world as the opinion of the finest—I hope I may say—sailors in the world. Under these circumstances, when we come here to discuss it, surely a Naval Officer may express an opinion, and, consequently, move a resolution. I know I heard opinions expressed very strongly indeed, by a naval architect against Captain Noel, in this room last meeting—very strong opinions indeed were expressed. I am sorry to say, in my opinion, the gallant Officer who has written this Essay, has entirely failed in carrying out the object which this Institution had in offering a prize. He starts by telling us "Reviewing our present Navy, we cannot but feel proud of its great "strength and of its undoubted superiority over that of any nation, or even of any "other two nations. Our ships are not only numerous, but well-built, powerfully "armed, and admirably equipped." I beg to join issue at once with the gallant author of this paper. I feel very strongly indeed, that our ships are not only not numerous, not only not well built, not only not powerfully armed, but they are not admirably equipped. I must confess I look with the greatest possible fear and dread upon the state and condition of our Navy at the present moment. I am not going to place merely my own opinions before this meeting of brother Officers, but I will prove my position by the opinions of the best Officers that ever trod upon a plank or sailed under a pennant. Captain Noel tells us that the "Hercules" and "Sultan" have been thoroughly tested and found efficient as sea-going ships. He also tells us that the "Audacious," and her five sister ships, I suppose he means her *four* sister ships—perhaps he did not remember that the "Vanguard" had sunk—and the "Monarch" are now efficient ships of war, but not of

a type likely to be increased in number; and in his third class he says the "Bellerophon" is a type of that class, and that she is a sea-going ship of deserved repute. Now, what do we find given in evidence before the Committee of Designs, by, as I said just now, some of the first Officers of this country, prime seamen, and as good officers as ever stood upon a plank? I will not, for a moment, venture to give my own opinion on the matter, but I will take, in the first instance, the present Controller of the Navy, Admiral Stuart. I have had the honour of knowing Admiral Stuart for some years, and I do not think you will find his superior, as a sailor, in Her Majesty's Navy. He says:—

"Question 4142. Mr. Reed designed the 'Monarch,' 'Hercules,' 'Bellerophon,' and 'Audacious' class to sail as well as sailing ships, and I expected that the 'Monarch' and 'Hercules' would sail well; but they do not do so, nor do the 'Audacious' and 'Vanguard.'"

Again, what does Admiral Sir Thomas Symonds say—I suppose he is an undoubted authority with every one present in this theatre and in the whole of England I should imagine—he says:—

"Question 1064. When the 'Hercules' pitches you will see her spur right out of the water, and it is the same with any one of them. They jump out of the water in a way that you would hardly believe possible. I have known the 'Hercules' when the Channel Fleet was exercising steam tactics, report, in answer to signal, February 5, 1870, off Lisbon, a roll of 27° to starboard, and 25° to port. Where would be the water-line heavy armour plating?"

"Question 1084. I have seen the 'Hercules' running with everything furled upon the mizenmast, and chiefly upon the mainmast with her sail all forward, broach to, carry away the wheel ropes, and become perfectly unmanageable without steam, and with a nice steady breeze running before the wind at 10 knots."

With regard to the "Audacious" class, the scientific principles upon which they were built, that of throwing the centre of gravity up high, is one of the most astounding I have ever heard of in my experience at sea, and I am quite certain the Honourable Member for Derby would be horrified at the idea, that because you put on a heavy deck-load, so long as you make that deck-load sufficiently cumbersome, the ship becomes more seaworthy—but, however, that was the scientific principle upon which the "Invincible" class was built. This is the report at a trial trip of the "Invincible," in October, 1870, of which I will read the account to the meeting:—

"The 'Invincible,' Captain Lambert, in charge of Captain C. Fellowes and staff of the Steam Reserve, left Plymouth Sound for the six hours' official steam trial. At the time of the 'Invincible's' leaving the Sound, she was at a draught of 21 feet 8 inches aft, and 20 feet 6 inches forward, her double bottom not being filled with water, and having no ammunition on board, the object of this trial being to test her new screws at a six hours' run of uninterrupted steaming. At starting the weather was quite calm, but prior to her return a strong breeze set in from the westward with proportionate sea. The ship during the trial was kept with the wind abeam, and when she first hove in sight on her return, steaming in from the southward, she had the appearance of being almost on her beam ends; and as she approached the Sound it became evident that she was heeling over 17° to 18°, and the greatest anxiety prevailed on shore for the safety of the ship. Although the 'Invincible' heeled to this extent, she had not a stitch of canvas set, and her topgallant masts were on deck."

And in evidence what is said in answer to—

"Question 3713. Lord Dufferin (Chairman). I never heard any captain condemn his ship more completely than Captain Lambert did, and I have never read a report so fatal to a ship as the report of Captain Fellowes, especially as the captain of a ship generally (perhaps in a praiseworthy manner on the part of the Officer) sounds the praises of his own ship."

As ships they are nearly useless and as fighting machines worse than worthless, as shown in the evidence of Mr. Wm. Pearse, of the firm of John Elder & Co. He says in reply to—

"Question 2079. The bottom is generally weak and should be strengthened.

"Question 2080. In fitting the machinery, if we had any doubt of the vessel

"grounding, we boomed the vessel off from the quay into mid-stream to prevent it, knowing that if she touched the bottom even with the water only leaving her 10 inches, something would break, either a frame or a bracket plate."

"Question 2085. The 'Audacious' is very weak, so far as her defensive power is concerned. In the first place, the main deck forward and aft of the battery is only about 4 feet above the water line. This deck is of 3 $\frac{1}{4}$ -inch fir, and $\frac{3}{8}$ -inch steel plates, the top side above the main deck is of $\frac{1}{8}$ -inch steel plating; this is the *only* protection to prevent a shell going below the main deck to the boilers and engines—it would get to the boilers and engines, and also, in my opinion, get to the magazine, seeing that the magazine bulkheads are only of $\frac{1}{4}$ -inch plating, with two thicknesses of inch teak.

"There are four large ports in the battery having an area of 15 square feet each. I think rather than make a pretence of protecting guns in that way, that it would be better to give them no protection at all."

"Question 2215. When I said that one of these ships would not stand that (bumping), I was speaking of circumstances under which an ordinary merchant vessel heavily loaded would stand such bumping."

"Question 2232. Under circumstances in which the 'Audacious' would inevitably be destroyed, an iron merchant ship might not be damaged."

The other ships now left to us are the "Audacious," the "Triumph," the "Swifture," and the "Iron Duke," and in my humble opinion they are all equally bad. I should say that more wretched ships it would be hard to find floating on the ocean. These ships have been heavily ballasted. I moved for a return in the House of Commons last year, and I find that has been the case with a great number of Her Majesty's ships. I heard Sir Spencer Robinson say at the last meeting, what, of course, we all know perfectly well, that in olden days ships had a certain establishment of ballast. Of course they had; they were sailing ships; it was necessary to put ballast into those ships, because they had their centre of gravity thrown up high by their batteries; but I must confess I never heard of putting ballast in a steamer; I can hardly conceive such a thing possible as a man sitting down in his office and designing a ship with tremendous boilers and engines, and no end of coal on board, and then sending her out to sea and finding that on her trial-trip she heels over 17° or 18° under bare poles, quietly saying that there was some slight mistake and then having to put 600 tons of ballast on board that ship.

SIR SPENCER ROBINSON: I beg your pardon. The "Sultan" has only 460 tons by your own returns.

Captain PRIM: 400 tons of scrap iron and cement. You are quite right. I beg your pardon. But even if she had 400, or even 4 tons of ballast on board, it would be equally disgraceful to those who designed her. Now, with regard to the "Bellerophon," this vessel was pronounced to be the very acme of naval science. There was no impediment thrown in the way, and she was to be a most perfect ship. What do we find in the evidence before the Committee on Designs? Mr. Reed said, "I freely stake my reputation on the fact that the 'Bellerophon' cannot fail to steam over 14 knots." Admiral Yelverton reports (Channel Fleet, 1866), "I think the 'Bellerophon' ranks below the 'Lord Clyde,' and on a par with the 'Ocean' and 'Caledonia.' In this respect I was disappointed, for I expected much greater speed. In steaming full speed, the 'Bellerophon,' 'Ocean,' and 'Caledonia' were nearly alike."

Everyone knows that the "Caledonia" and "Ocean" are wooden line-of-battle ships, converted into ironclads to meet an emergency, and their full speed at sea was 11 knots.

Then Admiral Warden (in 1868) shows that the old ironclad "Achilles," of the "Warrior" class, averaged a speed of a little under 13 knots, while the "Bellerophon" could only do a fraction over 11 knots an hour. But the most convincing testimony to the inefficiency of the "Bellerophon" was given before the Admiralty Court, in the case of the steamship "Flamsteed" *versus* Her Majesty's ship "Bellerophon." Captain Richard Wells, of Her Majesty's ship "Bellerophon" stating, that this ship "lay like a log upon the water when hove to; that, if there was plenty of wind and the sea suited her, she could be kept on her course; but it was difficult to keep her off the wind, if the sea did not suit her; her after

"sails were of no use in keeping her to the wind; but, on the contrary, had to be set to wear the ship;" [a startling novelty] "under sail alone she was unmanageable," and "more unmanageable in strong than light winds."

The "Bellerophon" was designed to compete with the "Warrior," and entirely to distance her in every respect. "The 'Warrior' was first, and the 'Bellerophon' last," and further on Admiral Warden says, "Here again we have the 'Achilles,' one of the first ironclads built, distancing, in a run of 100 miles, occupying eight hours, some of the latest constructed ships, containing generally the most recent improvements, condenser, &c., in a very remarkable manner. . . . It is to be borne in mind that, while the engines of the 'Achilles' develop 5,700 horse-power, to drive 6,000 tons, those of the 'Bellerophon,' 'Lord Warden,' and 'Lord Clyde,' develop about 6,000, to drive 4,000 tons. It is a result, I think, calculated to give rise to very serious reflections."

The CHAIRMAN: May I ask you to keep as closely as you can to the subject of our discussion, which is the Prize Essay, and not the conduct—present, future, or past—of the Board of Admiralty?

Captain PIM: If it is not the wish of the meeting that there should be free discussion on this matter, I really must decline to go on. Sir Spencer Robinson had an hour and a-half, in which he showed the admirable qualities of his own ships.

The CHAIRMAN: He very properly criticised the remarks of the Prize Essay, and did so without one word that would, in any way, hurt anybody else. We want freely to discuss the Essay, and all the points bearing upon it; but we do not want to go into all the details that are not mentioned in it; and we do not want one word said which could give anybody pain.

Captain PIM: I am sure anyone who knows me would be perfectly certain that I have no wish to hurt the feelings of anybody. I consider it most painful, but, at the same time, it is a duty that I have to perform, to show this meeting that we have about as unreliable a Fleet at this moment as it is possible to have. And you must bear in mind, I am not saying this for the first time, as something new; it was amply discussed in the House of Commons. I wish to show this meeting that we have about as unreliable a Fleet as it is possible for any nation to have. I am simply enlarging upon a sentence in this Essay, upon which the Essayist's conclusions are based; and I take it I have a perfect right to do so; but, if I am not allowed to give free expression of my views, as an English sailor, all I have to say is, if there is any responsibility in the matter, you may take it, for I certainly decline to go on.

Admiral STUART: I would ask your permission, as a gallant and distinguished member of the Legislature has paid me such a high compliment, and one which I do not deserve, by acknowledging me as an excellent judge of the qualities of seamen, to explain, with reference to the part of my evidence before the Committee of Designs, which Captain Pim has selected with reference to sailing armourclad ships, that the question I was asked was, whether I thought ironclad ships could be designed to sail well, and that part of my answer on the subject, is picked out. I merely said that it would appear by the past history of ironclads, in our own Navy and others, that they could not be designed to sail well, but that did not in any way trench upon their qualities as ironclads; it was simply as to whether I thought an ironclad could be designed to sail as well as ordinary ships; and I think, in the same evidence, Mr. Reed gave a very clear explanation of why it was found necessary to put ballast into these ships, and in that evidence he stated, in designing the ships, he always contemplated to develop the extraordinary qualities of steadiness which he wished to arrive at in ships of an entirely new type or design, that it might be necessary to place some ballast. I do not enter into the question of the value of that answer, but I think, if certain evidence given before the Committee is quoted, it would be much fairer to give the whole of the answers that bear upon the question.

Major MONCRIEFF, F.R.S.: Sir Henry Codrington and Gentlemen, I have very few remarks to make, and I shall endeavour to restrict what I say to the subject under discussion, especially to that part of it with which I am most familiar. Both the author of the Essay and its critics agree, and all that has been advanced leads to the conclusion that it will be a very difficult task indeed to meet, in the designs

of war-ships, the new requirements which recent improvements in artillery have rendered necessary; while, unfortunately, it has also been demonstrated that the necessity for meeting them is much greater than it was, and becomes more and more pressing with each improvement in artillery. I do not intend to offer any opinion as to the types of vessels which have been recommended, or to criticise those existing; but I should wish to remind the meeting that on all hands it has been agreed that the defensive power of an armoured vessel, or, in other words, her armour, must now be confined almost entirely to her vitals—unless that armour is made thinner and lighter than what is pronounced to be requisite. In these vessels (the “Nelson” and “Northampton”) a most ingenious and, what appears to be an effective plan, explained by Mr. Barnaby, has been adopted for dispensing with armour in the bow and stern parts of the ship, but in the central part strong armour is placed, so as to protect the water-line and the machinery. Sir Spencer Robinson and the Chief Constructor explained that the armament of these vessels is, in fact, the men and the guns, which are also protected by armour, to a certain extent, but not so much as they could wish. The Prize Essayist, recognising the great sacrifice at which even this slight extra protection to the men is obtained, actually recommends, as a better alternative, that the armament and men should be left entirely unprotected, so as to obtain the maximum offensive power compatible with the safety of the ship. The discussion has brought out strong arguments in favour of this alternative.

In these circumstances, I submit that any other alternative that is reasonable and practicable, which would obviate that sacrifice on the one hand, or that exposure on the other, ought at present to have attentive consideration. I beg to say that such an alternative exists, viz., the disappearing, or Moncrieff principle, carried out by hydraulics. It has been submitted in more than one form. On the 1st of February, 1870, it received very favourable opinions from the Lords Commissioners of the Admiralty, but the proposal (which, I dare say, has not been considered in all its bearings) came from myself—while I was in the employment of the War Office, applying the disappearing principle to land service—and was therefore probably considered as a subject which should be first tested by the War Department, before any serious application of it was made by the Admiralty. Accordingly, this course was suggested to the War Office by the Admiralty at the time. At that date, viz., February, 1870, I had not a design for a land service carriage of this kind prepared, and I regret extremely, both on personal and national grounds, that the recommendation of the Admiralty did not lead to a trial with such heavy guns as are required on board ship. The War Office, notwithstanding my earnest solicitations at subsequent dates, still restrict the application of the disappearing principle to counterweight carriages, which are not applicable to the Navy, nor so good for heavy guns on land. The consequence is, that at the present moment we are discussing the armaments of vessels and their designs, and admitting great and inevitable difficulties, some of which might have been absent, had that principle been developed by practical trial. I confidently assert that such trials will at once remove all hesitation to use it in those ships for which it is adapted. I think most sailors allow at the present time, that the disappearing principle would be of the greatest use, if successfully applied. To explain my meaning take, for example, this vessel, which has a strong iron deck, 4 feet above the water-line, at the level of the top of the armour. It stands to reason if you can afford to have the ports 2 or 3 feet above the deck, that is 6 or 7 feet above the water-line, and if you can deliver fire through these ports as effectually as at present, which I guarantee to do, that a result of some importance is within reach. The guns can thus be loaded and worked underneath the armoured deck, where the men and the machinery are entirely protected by sufficient iron plating or by the water itself. You thereby at once get one advantage of Captain Noel's proposed vessel, viz., the absence of extra armour, while at the same time you escape from a disadvantage of this belted cruiser (the “Nelson”), which Captain Noel endeavours to avoid at the expense of great exposure. In other words, you obtain the means of carrying a much larger armament, without loading the vessel with high and extra armour, expressly to protect the men at the guns; while the protection you do obtain for them, around any of the guns thus mounted, is not of doubtful strength, but is complete, being the same

which is provided for the ship itself. As yet I have only been speaking of the application of this principle to broadside guns. That, however, is not the only, or, in my opinion, the best application of this principle. I think its best and most complete application is to deck guns, for all round fire. The guns in the barbette towers of the "Téméraire" are mounted on this principle; at any rate, I submitted designs, on the 30th September, 1873, at the request of the Admiralty, for that vessel, which I understand have been carried out by a great engineering firm, with some modifications. These guns, however, would have been mounted on this principle, to much greater advantage, could the towers have been dispensed with. They very much hamper the service of the gun, and thus cripple its efficiency. The barbette towers were decided on for the particular requirements of this vessel before the disappearing carriages for them were designed. When the armoured deck has sufficient height to dispense with such towers, great advantages can be obtained.

The ordinary revolving turret will, I presume, now weigh 350 tons. If so, four guns could be mounted, with all the advantages of lateral range and protection afforded by these turrets, with a saving of at least 580 tons top weight. Now, it has been explained to us what increase of armament can be substituted for 580 tons; seeing this, and seeing that the ordinary turret requires at least as high an armoured deck as is required for my principle, it surprises me, in view of the value of this large saving in weight, that no attempt has been made in England to apply that principle in its integrity—that is, in the manner it can be most advantageously used. At this critical and transition stage in naval design, I hope it may be recognized to be the interest of the State to develop the principle I advocate, along with other alternatives, so that it may be proved and ready for application by the naval architect, in any case in which he can use it with advantage and economy.

I should have offered some remarks upon the application of the "Moncrieff" principle to circular vessels, recommended by Captain Noel in the Prize Essay, but as this would lead me into details which, I think, are better avoided in this important discussion, I shall not further occupy your time.

Commander W. DAWSON, R.N.: Mr. Chairman and Gentlemen, the Prize Essay which we have met together to deliberate upon, and which has met with the approval of three of our most eminent Admirals, has been spoken of by Sir Spencer Robinson in a way which shews that the essay is one of very considerable importance, otherwise it would not have received the marked attention which he has given it. In his remarks Sir Spencer spoke of the essay, as we should expect a person in his high position and of his great authority, with great dignity, forbearance, and judgment, and what he said received very great attention from us all. Nevertheless, I am placed rather in a difficulty in following Sir Spencer Robinson and commenting upon this essay in consequence of the impression which he conveyed, that any suggestion as to the improvement of former designs, or as to the adoption of new types of ships, was a reflection upon the designers of the older vessels. But if there be any truth in such an idea, then the persons who originated those everlasting improvements in our fleet, are the real authors of these reflections upon the older classes of ships; and as the same naval architects described both the older and the newer vessels, they have been denouncing themselves by these changes. Though it is many years since the "Vanguard" and her sisters were built, they have not been repeated. Many other descriptions of broadside ships, and many other types of vessels have been subsequently built not only under Sir Spencer Robinson's administration, but under the administration of the present Controller; and not many weeks ago we were engaged in this theatre in discussing an altogether novel class of ship, brought forward by whom? not by Captain Noel, not by any stranger or outsider, but by Mr. Reed himself. So that if proposing improvements in the ships previously built is to be looked upon as an attack on the architects who designed them, then it is those architects themselves who have attacked themselves. Let us rather cast aside all feeling of personality, for if personalities are to be brought into this discussion I should feel extremely awkward in discussing a scientific Essay. Captain Noel is not an architect, but as an Officer of common sense he has read the writings of eminent men, he has gone to the works of naval architects, and he has borrowed ideas from naval architects. The very ship he puts forward in this essay is practically to

all intents and purposes the ship brought forward in this Institution by Mr. Barnaby, and discussed by us some three or four years ago. Captain Noel has had the temerity to offer a few suggestions for altering some of the details of the "Nelson," and those alterations, it is agreed on all hands, are not improvements, but substantially the principle which Captain Noel goes upon is the principle recommended in this Institution by Mr. Barnaby three years ago, and now embodied in the "Nelson." What was that principle? Simply this, that it was far more important for the purposes of her own defence that the ship should be able to throw a heavy fire than that her top-sides should be able to resist a heavy fire. Mr. Barnaby asked, three years ago, "Are you prepared to throw off so many hundred tons of armour in order that you may obtain so many hundred tons extra of armament?" and the general reply was, "Yes, give us plenty of big guns that we may hit many heavy blows." What has been the rule with reference to armament? Why in all the later iron-clads there has been a continual diminution in the offensive power of the armament. We have an instance in the "Devastation," a ship of 9,000 tons, carrying only 140 tons of ordnance. That is a very limited offensive power for any first-class iron-clad. A vessel of 9,000 tons displacement required to carry 140 tons of ordnance, and that 140 tons is necessarily divided into only four untried pieces. If anything happens to one of these four untried pieces, one-fourth of the armament will be lost. Besides that, the chances of hitting are very much smaller than Captain Wilson put it, for I believe that under the best circumstances of firing at a target it is somewhere about one hit in ten shots; and it would be much less in firing in a naval engagement. The general principle of heavy armament and unprotected batteries which Captain Noel advocates is really the same as that adopted in the "Nelson." It is quite a new idea which Sir Spencer Robinson has brought forward, and which I am sorry to hear supported by the present Controller, that a ship of this class is to run away from every hostile vessel that it meets on the high seas if that hostile ship has a strip of armour over her guns.

SIR SPENCER ROBINSON: I beg leave to state that is not my meaning.

Commander DAWSON: She is not to fight a vessel which has armour-protection to her guns?

SIR SPENCER ROBINSON: She will not fight on equal terms a vessel with armour-protected guns. I said nothing about running away.

Commander DAWSON: There are only two ways of dealing with a hostile vessel at sea. You must either run away or fight. What is the principle kept in view in the construction of our ships? The principle laid down by Sir Spencer Robinson here. I should not take it up as a mere catch-word if it was not constantly dinned into our ears in the public press from time to time that a special ship is built to fight another special ship of the same class. That is quite an absurdity. A special ship is most unlikely ever to meet in hostile encounter a vessel of the same class. If there were an European war to-morrow, what are the chances that the "Nelson" would fight a vessel of her exact type? The chances are one hundred to one against it. Indeed, she could not find a foreign ship of the same type, because there is not another such ship in existence, so that she would not fight at all. Any British ship, large or small, armoured or unarmoured, driven into a corner—and remember British ships have not always got the best legs, and cannot always run away—should be able to avail herself of a certain amount of the chances of war, whatever the thickness of their respective hides, the British ships should have teeth wherewith to attack the enemy and give him a bite. But if you take away from British ships their armour-piercing guns, so that they cannot pierce hostile armour, if you do not arm them with projecting stems, if you do not provide them with torpedoes, then those unarmoured ships when attacked by a Japanese, a South American, or a Turkish ironclad, or by a weak ironclad of a stronger nation, have no chance for life. Such British ships must run, and when they cannot run, they must strike the British flag, simply because they have no teeth to bite with. The teeth (guns, prows, and torpedoes) put into them is regulated by the thickness of their own hides instead of by that of the hides of possible opponents.

The salient point which Captain Noel puts forward, has been very wisely fought shy of in this discussion, namely, the sinkability of ironclads. The "Vanguard,"

we are told, was built to fulfil a certain object; and we must not question her design, because she has fulfilled that object. What object has the "Vanguard" fulfilled? She is at the bottom of the Irish Sea. This is the vessel, the design of which Captain Noel (not knowing she was about to descend to the bottom of the Irish Sea) ventured to question. But the "Vanguard" is not the only ironclad by some half dozen that went to the bottom of the sea, without injury to their armour-plating. Other ironclads have had awkward premonitory abrasions of the skin tending towards "taking soundings." I am speaking in the presence of many naval men, who will remember various scratches which the skins of iron ships have had within the last fifteen years. Do not you remember how the "Defence," lying at Spithead, had a nasty scratch made in her skin by her own anchor? and how the "Warrior" had an awkward scratch made in her skin by some gunboat? The "Northumberland," too, had a nasty premonitory scratch. And do not you remember, Sir Henry (Codrington), when you commanded at Devonport, how one of your ironclads had a very awkward scratch? Who gave that invulnerable armoured ship that scratch? Not another ironclad. No; a small Irish passenger steamer. It was in smooth water, and at slow speed. I venture to say, that as Commander-in-Chief of that Fleet, Sir Henry Codrington must have had curious speculations as to what might have been, had that ironclad been in the open sea in rough water, and that Irish passenger steamer, going a little faster, had struck that armoured vessel a little harder. The consequence might have been that we should have had an ironclad at the bottom of the English Channel, as well as one at the bottom of the Irish Channel. What the Essayist has placed in the fore front of requirements is the unsinkability of ironclads. He has not given us a complete cure for it; but he has pointed out a very important defect, which ought to be considered, not only in the construction of ironclads, but also for the destruction of hostile ships in battle. If there is anything in this Essay about which I feel sore, it is, that the writer has unfortunately taken to pieces our own ships. I have long wished to see all foreign navies taken to pieces in this way; so that every English Officer, knowing where are the soft points in each foreign ironclad, might know what could be done for its destruction by his own vessel, however small, in case he were obliged to contend with a hostile vessel, however large. In this question of doing injury to the bottoms of ships, the small ship will have an advantage in the fight over the longer ship. I mean that an ordinary small, somewhat short and handy, unarmoured ship, may not altogether despair, if attacked by a vessel trusting in her armour alone. I do not mean a ram specially built for the purpose; but that those frigates, corvettes, and sloops-of-war, now traversing the seas, if properly armed at the stem, and protected by armour-piercing guns, would, if driven into a corner, have some chance in a fight with long armoured vessels, say like the "Northumberland." These unarmoured ships and thinner plated ironclads would have so fair a chance in the fight with thickly armoured long ships, that the Captain who attempted to haul down the British flag without trying the fortunes of war, would deserve to be hung, drawn, and quartered.

There is a chapter in this Essay, the heading of which I do seriously object to, and that is the chapter headed "Coast Defence Ships." But the existence of that chapter is not Captain Noel's fault. It was the fault of the Council of this Institution, with all due deference to you, Sir Henry, for giving him such a title to write upon. But having such a chapter given, I do not know that Captain Noel could have treated it better than he has done. I object to that term "coast defence ships." "Coast defence ships," as applied to the British Islands—what does it mean? It means this—sending a certain number of ships to blockade hostile ports in all weathers. That is England's coast defence; it is the only floating coast-defence England has ever had. There never has been a ship built in this country to this day—and this is an historical point—there never has been a ship built within the memory of any man living for the purpose of the coast defence of England. Certain ships were built for sea-going purposes, and those ships failed. I do not blame the naval architects who thus failed, because naval architecture is an inexact science, in which progress is made by guesswork. I have great respect for naval architects, but I do not look upon them as people who cannot make mistakes. These failures were designed by most able men, and science has learned

a great deal from these mistakes. So far from blaming those designers, I give them great credit for their courageous ventures; for if there had not been such bold ventures, England's Navy would never have been in the proud position it now occupies. Do not mistake me, then, when I reflect upon some of the ships of England. The war ships of England are the pride of England. The whole of Europe and the whole of America look to the constructive department of the English Admiralty for examples for the construction of ships of war. Therefore, it does not at all follow, because we point out the errors of the past, that we are at all blaming the courageous and talented administrators and designers who have fallen into those errors. For my part, I do not blame them at all. But what are these "coast defence ships?" Vessels built for sea-going purposes, and to blockade hostile ports. But they were found not to be sea-keeping, or not to be seaworthy. These unseaworthy or unseakeeping ships were therefore placed in the list of "ineffectives," but we do not manufacture "ineffectives" purposely, merely to put them on the "retired list." These so-called coast defence ships are simply "ineffectives" placed on the "retired list," some hidden away at Bermuda, others up the Tamar, and so on—"out of sight, out of mind"—with the hope that they will pass out of existence as quietly and as soon as possible, seeing that their maintenance on the retired list is an expense to the country. Moreover, I do object to unseaworthy vessels being called English "coast defence ships." A ship which can manage to weather a gale in the Atlantic might not be able to weather a gale on the coast of England. For this reason: a Captain of a ship in the middle of the Atlantic has only to think of the winds and the waves, and he manages the ship with respect to the winds and the waves; but a ship caught in Cardigan Bay, with rocks under her lee, cannot be navigated with reference to the winds or the waves; she must be navigated with reference to the rocks under her lee, and, consequently, the vessel is far more tried as to seaworthiness than she would be if in the middle of the Atlantic. A ship for the coast defence of England must be far more seaworthy than if she had to go abroad. Therefore, the greater number of vessels now classed as coast defence vessels are not properly so called, in consequence of some being unseaworthy. The others, which are unseakeeping, cannot be properly so classed, for they are not designed specially for shallow waters. None of them have the special requirements wanted in vessels designed for shoal water and stormy seas. The term "coast defence ships" might be correctly applied to circular vessels, because they are designed for shallow waters and for the special purposes of inland waters. In designing a circular vessel for the special purpose of defending the Thames or the Mersey, a real coast defence vessel might be obtained. I think I called the circular vessel for sea-going purposes a saucer-shaped diving-bell, but it might be made at least a floating structure which would float a battery in inland waters for special coast defence. What we want, however, is not a special class of vessel for inland waters, that is to cost £300,000 a-piece—it is not a single costly vessel of limited usefulness at the mouth of the Thames. What we want, is a multitude of sea-going and sea-keeping gun-vessels; the smaller the better; the heavier their guns the better; but they should be vessels which can go anywhere, and in any weather, and not be caught, as one of our so-called coast defence ships was, in going from Plymouth to Cork, when the barometer got too low, and the sea too high, and the Captain put back to Plymouth, reporting that it was a merciful interposition of Providence that this ironclad vessel got back to harbour at all. That would not happen to a broad-beamed seaworthy gunboat. Having very shallow draught of water, such vessels could go over the banks into shoal water, where they they could not be run down by deep draught ships which could not go there. Shoal water would, therefore, be a place of safety to vessels of this class. I will only, in conclusion, say, that so far from looking upon Sir Spencer Robinson's remarks as being in any way adverse to the ability with which this Prize Essay has been written by Captain Noel, I look upon Sir Spencer's remarks as the highest compliment which could have been paid to the judgment of the Referees in selecting this Essay. With all its faults of detail—and one can see at a glance that some of the figures are wrong—still, in its general principles, the Essay recommends itself to me as worthy of careful consideration; but I do not say necessarily that in every case Captain Noel's suggestions are worthy of adoption.

Admiral SELWYN: I wish to go a little more into the discussion of the paper, and less into the discussion of what has preceded the paper, than many other speakers have done. I think if Captain Noel's pamphlet had only been written to draw our attention to the fact that we have good reason to be dissatisfied with the resisting powers of our present armour, it would have had a very valuable effect. I wish to lay down as an axiom, and I think it will be generally adopted, what all our trials against armour have shown us, that wherever armour can be pierced by such guns as are ordinarily carried at sea, it ought not to be carried at all; that so far from being a defence to any battery which it surrounds, it is the very greatest danger, for the portions of the armour driven in by the shot, far exceed in number the splinters that would be made, and any damage that could be done, by shell. Therefore, when we draw attention to the necessity of armouring only in one part, and not in two or more widely separated places, making both by that process inefficient, the armour devoted to keeping the ship above water is decidedly the most important, since it is very little use to keep your battery intact if your ship won't stay afloat. But now that armour being incapable of resisting many of the modern guns, and the armour above being positively a danger, both are equally thrown away. He has brought forward, I think, a principle which ought to receive the closest consideration from the authorities—that it would be wise to limit the application of armour entirely to the protection of the ship's buoyancy, unless it can be given (which we have not as yet dreamt to be possible) in such measure as to entirely protect the battery, after the primary want has been satisfied. Major Moncrieff has brought forward a plan which I for one very highly appreciate: it is that of thickening the armour at the water line, possibly extending it both in height and depth, and fighting the guns below that armour and below water, bringing them up only to fire, letting them recoil under cover. With those conditions we can get as well a protected battery as a protected ship. But there is unfortunately another element of consideration, which is that the torpedo renders it impossible, where it is employed scientifically, ever to fight actions abeam at all, at least within its range. If a torpedo can be launched from the side of a vessel, and strike the bottom of her enemy lying abeam, I do not think there is at present any possibility of preventing the destruction which would ensue resulting in the sinking the vessel, unless by one or both of two methods. One is that cellular bottom which I have always advocated. This is said to be impracticable, because the engines must be all in one part, the coal-bunkers must be in one part, and the vessel cannot be cut up in sufficiently small portions on account of the large space occupied by the engines and boilers. The second method, which also commends itself very strongly to my appreciation, is the use of the turbine. The turbine-propeller can be separated into any number of small machines you please, and will be equally efficient with the largest propeller going. It is true the increased engine friction will come in to some extent and diminish its value, but it may be in the different compartments of the ship, and will draw out the water from any portion of that ship, whereas the screw must necessarily be applied at the end of the ship, and the friction lost by the long shafting will be probably found very nearly equal to that lost by the division of the turbine power. But there is this great advantage in the turbine, that the whole engine-power of the vessel in case of necessity can be devoted to pumping out that vessel as well as propelling. Therefore I say no future type of ship ought to be considered without reference to those points of cellular bottom and devoting the whole engine power to pumping out the vessel. I know engineers are not in favour of casting away a whole mould-loft of patterns, and until necessity arises they do not like to adopt new designs. If by these methods you can have a battery protected by the same armour which protects the ship; if you can have machinery which can propel the ship and pump her out; I think you will do unwisely to deny practically that Commander Noel has given you a useful basis of thought for the future. It is in that view I think the pamphlet is most valuable. As regards his proposals for a rudder, I think the time has not arrived when we can safely put a rudder where he proposes, or move it by the method he has shown, since the chain would be liable to damage, and the whole steering power would be gone. I will say further sail power is to my mind an absolute essential of all sea-keeping ships, and that sail power must be put into ships, not as we have hitherto put it in, apparently in utter carelessness of whether the ship will stay or

not, and with an unfortunate result that in most instances she won't stay at all. It is clear we must consider the placing of our masts more closely than we have hitherto done. Then comes the question of amount of sail, and whether an ironclad can be propelled at the same rate as any other vessel. I deny that there is anything in the shape, flotation, weights, or any other circumstance why the ironclad, with the magnificent models we see here constantly repeated, cannot be propelled by sail-power as fast as any vessel has ever been of that tonnage with proper sail-power. If you say the vessels are so built that they cannot by any possibility support sail-power, that their inclination will be too great under it to be safe, then I say that is a mere fault of construction, which I think any engineer would be ashamed to repeat twice. A person who puts ballast into a ship goes back to that time which we all recollect when our line-of-battle ships did carry about ballast with them, because their builders did not know how to thicken the bottom; and Sir William Symonds did away with it all by putting more oak into the bottom. The "Albion" and many other of his vessels went to sea without one ounce of ballast, and any engineer would have no difficulty in so disposing his weights as to keep an iron ship upright without resorting to brick and cement. The question as to stability is one which I must beg the members of this Institution to recollect in naval actions, as they will be at present fought, under steam, is very much less important than it used to be. If you prevent your ship from rolling, which you do by abandoning that extravagant idea of the steady platform which gunners have so much insisted on, and which yet has not enabled them to obtain a very great improvement in fire,—if you consent to come within a distance within which your shot won't miss, then I think you will find the stability, or rather the inclination the ship is likely to take during the action, is not such an element of importance as has been generally supposed; that is to say, we could carry our guns provided they be protected guns, as low as Major Moncrieff wishes them to be, without any danger of water entering the ports, and with sufficient command. The advantages gained are so very great over any system which puts the guns and the weights protecting them on the deck of the ship, that I do not think many men would choose the other alternative. As to vessels of the "Devastation" type, I think if designed as sea-going ships we ought to inquire very closely indeed what amount of coal they can really carry at full power. It has been said over and over again, if you consent to go at a certain speed you can go a great distance, but our enemies won't always consent to go at that speed, and if we cannot always equal them in steaming power without fear of expending all the coals on board we cannot call ours a sea-going vessel at all. We must either carry more fuel or carry condensed fuel. With regard to mastless ships, are they sea-going ships in any true sense of the term? Are they such ships as we could blockade a port with? My experience has been that it is almost impossible, what with fogs and steamers, to blockade any port effectually. I should like to see the time come back again when you knew where your enemy was going, when you had studied the wind and tide; but that is to-day impossible, and it is no use to talk about blockading a port unless you can do better than the Americans did at Charlestown; they could not do it—it was utterly impossible to prevent the blockade runners doing as they pleased. If you, however, rely on blockading ships you must have sea-going ships. Are you prepared to do that? Will a mastless vessel carry to sea sufficient coal to enable her to chase any vessel for a day or two, and come up with her if possible, and fight her, and then come back to her station perfectly prepared to perform her duties? If not, she is not a "sea-keeping" ship. Circular ironclads have this to recommend them: that they are unmistakably, as compared with all mastless ships of deep draught of water, of enormous advantage. It has been objected that they will not go as fast as ships of an ordinary type. If any gentleman consults Beaufoy's experiments, he will find that whereas the resistance of a square plate to forward progress at the rate of 8 knots is 224 lbs. per square foot, the resistance of a sphere of absolutely the same sectional area is only 64 lbs. Mr. Elder did not propose vessels as built in Russia, but the lower segments of large spheres of 16,000 tons capacity, and with fine water-lines, and the fair way is to compare them for speed when so built with their equals in tonnage. Their size has been objected to because they would not go into docks. What is the use of putting them into docks? They might go aground, have their repairs made, and go off again as soon as required. What they can do, is to carry to sea an enor-

means amount of coal to go across the Atlantic and back at their full speed. What they can do, is to carry enormous gun-power: what they can do, is to carry unheard-of armour, and Major Moncrieff has shown how the guns can be placed below the decks altogether, can come up to fire, do their work, and disappear. I repeat the first consideration is the life of the ship—that is to be protected before and exclusive of the battery altogether, and I think naval architects must look to that. I have often heard my friend, Mr. Scott Russell ask naval men to express some opinion. He says, "If you only tell us what you want, we will do what you want." I think we do want that; and, secondly, that they should be sea-going ships, with such masts, sails, stores, and crew as may enable them to keep the sea when they are there.

Sir SPENCER ROBINSON: Would you allow me just two words of personal explanation. I observe two naval Officers, for whom I have the highest respect, have certainly misunderstood the object of what I said in respect to this Essay; both seem to think I have rather attacked Captain Noel, and that I have not felt, as they strongly feel, how extremely indebted we all are, every one in this meeting, every one in and out of the Service, to Captain Noel, for the pains he has taken in producing this Essay. Now, I am sure that I used the expression, as often as it occurred to me to refer to Captain Noel's work, "this very valuable Essay," and I spoke of him always as its "very talented author;" therefore, I think people who have censured me for the supposed attack I made upon Captain Noel have entirely misunderstood what I meant. I did not attack Captain Noel the least in the world, but I thought his principle, as to the war-ship required, wrong, and one which it was the bounden duty of any one who thought it wrong, to oppose. My idea being not that a ship should not be constructed on the principles laid down by Captain Noel for some particular service, but that for the particular service for which he suggests his type, namely, a first class ironclad ship-of-war, to fight another first class ironclad ship-of-war, it was, I thought, entirely unsuitable, and I said so; but my difference with Captain Noel was that and no other, and it was a very lawful and legitimate difference of opinion, strongly felt, founded on sufficient reason, and perfectly legitimate for me or any one else to hold and to express.

Mr. SCOTT RUSSELL: I have read the paper with extreme interest, and was charmed to find that such a class of young men as the one who wrote this paper, is being brought up to the service of the Navy, which we all know requires a great deal more of education than the service of past times. As to agreeing with him in everything, I think it is more the naval Officers' business to criticise his work than mine. I come here as one of those naval architects and ship-builders in whom a gallant Officer says he has no implicit confidence. But I beg to say, I came here for quite another purpose, which has been amply fulfilled. I came here hoping to hear a number of experienced naval Officers say distinctly, once for all, what I have asked them again and again to do. Now, I have heard more from naval Officers to-day of what they want their ships to do, than I ever succeeded in hearing before; therefore I go home a wiser and I hope a much better man. Now, then, in reply, I will say something which I hope will gratify you, the naval Officers who have instructed me, and I beg to say, as distinctly as I can say, that if you will please to lay down as a principle that you wish everything called a ship-of-war to be a good seaworthy ship, with good sea-going qualities, I give you my word of honour, as a professional man, that there is no difficulty in doing so consistently with all the practical purposes you want; but I must insist on your first deciding by saying, that you wish every one of your ships to be a good sea-going, sea-keeping, seaworthy ship, and therefore I am delighted with the courage some of you have had to say, that you want that. Now I say I want it most strongly, only I am not a sailor. I want it most strongly for this reason. I have been three days and three nights in the Bay of Biscay with enormous power trying to carry me ahead, and I have been fifty miles further astern at the end of the three days and three nights' work than I was when I began. Now I ask you, do you mean to say you will dare to call any ship a decent ship-of-war that cannot hold her own, and that cannot go ahead against any wind that is blowing? I do not. And as I know that no ship can hold her own in a decent storm, such as I am familiar with, which cannot go an honest nine knots an hour, so to say, that any one who will permit a ship-of-war to be built of any sort that goes less than nine knots an hour, is doing a thing which I, as a ship-builder, would entreat

you not to do. Therefore, pray do keep to it, that every ship shall be a good sea-going, sea-worthy ship, and that she shall have such speed and such power as to enable her to keep the sea in all the probable circumstances which may occur to her. You say next, she shall be an unsinkable ship. Allow me to say, that you have only to have the courage to demand it, and take a little trouble to look into it, and try to find out how it can be so contrived that it shall do what you want, and have the least practical inconvenience, and I tell you again, upon the word of a professional man, there is no difficulty whatever in building you not only a seaworthy and sea-going ship, but a perfectly unsinkable man-of-war; and the reason I say so is this, that I have built ships again and again intended to be unsinkable ships, and I tell you that again and again these have been run down, and ripped open, and have never once gone to the bottom, or showed the least desire to go to the bottom; I then go to the next point, and I say to you, with regard to your ships, allow me also to say all you have heard about the difficulties of closing doors, and all those things, and the dangers of this, that, and the other communication and separation, these are all nonsense, because if you make up your mind that you will have it, all the means of doing it are entirely at our fingers' ends: only you won't say you want it.

The next point I beg to state is this. A great deal has been said of the bad manœuvring of fast ships. Now, allow me to say to you, that it is perfectly easy, if you wish it, to make all your ships much more handy than they now are; only again I say, go to the Admiralty, and say you must have it, and you will have it; and you will have this ship able to turn in a given circle, with a given length, and a given speed, and I tell you we know the means of getting it. The next point in the structure of those ships, for which you may throw the blame upon us, is this, our liability to have to carry ballast and useless weight. Now, allow me to say, that an infinite deal of nonsense has been talked on the subject of loading ships in order to make them stable. It is not necessary in a steam ship,—mind I am talking of a steam ship, and I am not talking of a sailing ship,—it is not necessary in a steam ship even to carry one single pound of ballast for any purpose whatsoever, except to conceal some blunder that may have been made; and allow me to tell you why I make so dogmatic and unlimited an assertion. I do so for this reason. I will suppose your ship has 1,000 horse-propelling power. May I ask you what that propelling power is? That propelling power is ballast. How many tons do you carry in the shape of water ballast in the boiler, in the shape of iron ballast, called boiler and engines, and where is all that? All that is just where you want to put the ballast. What do you want then with other ballast? It is perfectly unnecessary. Allow me also to say to you, that there is not one single calculation in the stability of a ship which (in any ships I have ever seen constructed by competent men in my profession) had the least doubt about it, and that it is as easy to measure *before* you build the ship the exact amount of stability she is to have as it is *after*. Therefore, suppose you gentlemen of the Navy say beforehand exactly what top weight you want your ship to carry, and what amount of sail you want her to carry, and what the conditions are you want to have that ship in when she is put into your hands, and I tell you it is not the fault of these poor shipbuilders and these poor engineers if there is not every quality you desire. I shall conclude by asking you to believe that I do not talk nonsense when I say this one word. I only ask you to believe what I say upon my professional experience, and therefore I beg to tell you a secret. Almost all the ships I have built in my life (and I think I have built perhaps 150) I did not build as common shipbuilders build them. I did not build them on so much money for so much a ton of ship,—I did quite another thing. I always made the man who wanted the ship tell me how much he wanted her to carry; what voyages he wanted her to go; what work he wanted her to do; what speed she was to have; what, in short, it was his purpose to do. And I never made a contract with him as to how it was to be done, but I simply said, "Well, if you give me so much money I will put a ship into your hands which does all you want." That is the way in which I built every successful ship I ever built in my life; and I say, in like manner, if you, instead of getting out specifications of this, that, and the other details of construction, will only come together, and write down on a piece of paper

what you want the ships to do that you are to command when you go to sea, I guarantee that I know plenty of men who would give you exactly the ships you want.

The CHAIRMAN: I think that we have now gone through the subject pretty fully, and I am sure we shall all agree to thank the Essayist. Whether we do or do not agree with the details, we must all be gratified that an Officer, and one so young, has devoted so much of his time and talents, and has done it so successfully as Commander Noel has done in this Essay. I am sure it is extremely creditable to him, and we owe him our best thanks.

LECTURE.

Friday, April 28th, 1876.

MAJOR-GENERAL SIR GARNET WOLSELEY, K.C.B., G.C.M.G.,
&c., &c., in the Chair.

THE TACTICAL POWER OF MODERN FIELD ARTILLERY.

By Lieut.-Col. C. B. BRACKENBURY, R.A., A.A.G., S.O.G.I.

ACCORDING to a fashionable theory of philosophers, the life of a nation is an exact copy of that of an individual, and passes through the various stages of candid but credulous childhood, poetical and studious youth, vigorous manhood and grasping but feeble age. We were told by "the greatest, wisest, meanest of mankind," that "in the youth of a state, arms do flourish; in the middle age of a state, learning; and then both of them together for a time; in the declining age of a state, mechanical arts and merchandize." According to this saying we English, nay, we Europeans, ought to be in a condition of decrepitude. But, for my part I can see no signs of it at present. The roads that run from town to town and village to village favour the march of armies; the railways that render our trade easy and the existence of such cities as London possible, serve to collect and feed monstrous bodies of troops; the telegraphs carry the orders of commanders as well as the messages of traders; if the sea is covered with steam merchant ships, it bears up also heavily armed ironclads; and, while the present perfection of mechanical art produces a thousand luxuries hitherto undreamt of, it has also rendered possible the development of artillery.

I do not propose to inflict on you even a sketch of the history of field artillery, but it is necessary for the understanding of our subject that we should bear in mind how modern anything like a manœuvring field battery is. As late as 1799, the artillery train dispatched with the expedition to the Low Countries had to be improvised for the occasion. The guns, attached in pairs to battalions, were drawn by heavy horses driven by Dutch waggoners who walked beside their teams with long whips. Though Napoleon the First improved his artillery so that he and his Generals won great battles by its daring employment in masses, we English entered on the Peninsular war with our field artillery in a very poor condition. Shortly after the commencement of the Peninsular war, Wellington wrote: "I shall be obliged to leave Spenser's guns behind for want of means of moving them, and I should have been obliged to leave my own if it were not for the horses of the Irish Commissariat." A little later, before the battle of Vimiera (1808) he said: "Our artillery horses are not what

“ we ought to have; they have great merit in their way as cart-horses of dragoons and Irish cart-horses, bought for £12 each! but are not fit for an army that, to be successful and carry things with a high hand, ought to be able to move.” The carriages were in no better condition. Napier says that the pursuit of the enemy after Vimiera had to be stopped because “ the artillery carriages were so shaken as to be scarcely fit for service.”

Even so late as the battle of the Alma the guns sent over the river at a critical period had to be worked partly by officers because the gunners toiling on foot could not keep pace with them.

In the present day even field batteries can move for short distances at a gallop, carrying the gunners requisite for the service of the pieces, while the fire of the guns has increased to an extent which would then have been considered impossible.

Therefore, in trying to estimate the modern place of field artillery, we need not study old wars, but may confine ourselves to examples taken from the last war between France and Germany. The battles round Metz are especially interesting both because the Germans there met the flower of the French Army, and because a German artillery officer, Captain Hoffbauer, has given us a most careful and instructive account of the work of his own arm in those engagements. The instances we are about to examine are not all set before you as examples to be followed; some of them only show what is possible, not what is to be recommended.

Borny.—Few battle-fields could be more unfavourable than that of Borny for the action of artillery. It was intersected by ravines, water-courses, enclosed villages, vineyards, walls, plantations, and hedges; in fact it is one of those battle-fields where artillery can, as a rule, move only on the roads. The action commenced by a most plucky attack made by the advance guard of the 7th corps, the object of the corps Commander being to grip the enemy and force him to suspend his retreat from the right bank of the Moselle, and so give more time for the turning movement of Prince Frederick Charles.

The French were very superior in numbers at first, and remained more numerous to the end of the day even when all the available Prussian troops had come up. Moreover, they were fresh troops and fought with the knowledge that they could, at the worst, take shelter under the guns of Metz and her forts, even if forced to give up their strong defensive position.

Yet, in spite of all disadvantages, we find the artillery pushed well forward at first, and reinforced as soon as possible by the batteries of the I. Corps sent on at a rapid trot *far in advance of their infantry*. We find the batteries falling naturally into groups or masses whenever it was possible, and holding their own against both infantry and artillery fire. We find one of the masses limbering up under fire and moving to the right flank, which was threatened by the extension of the French left. An episode is well worth remembering. The right wing of Von der Goltz's brigade had dashed into a small pine wood, but found itself attacked and surrounded by heavy forces of the French. Hoffbauer's battery moved at once to a position about 800 yards from

THE PARTIAL DEFEAT OF MODERN FIELD ARTILLERY. The result is

The Russian battery is, or was then, 66 Officers and men, and 48 horses in the battle were 138 Officers and men. The damages to material were only one gun-carriage broken, though the ground was often very muddy after.

...the arrival of the advanced guard of the division near Tronville. Its battery immediately opened fire on the streets of the town were full of French cavalry and the French battery presently replied and drove them back. The French army had to be held fast at all hazards to prevent its junction with MacMahon's retreating columns, and the troops assembled at the 15th August was, like that of Borny, undertaken to check a very marked feature of artillery combats, quite sufficiently to have tactical reasoning upon as I shall do hereafter. In Tour, Vionville.—The battle of Mars la Tour or Vionville will find the greater losses of material compared with men and timber, and three wheels broken, though the ground was not so much damaged. The damages to material were only 200 horses and 200 mules. The French battery presently replied and drove them back.

The battle commenced by the arrival of the advanced guard of the 3rd cavalry division near Tronville. Its battery immediately opened fire on hostile cavalry horses, and the streets of the town were full of Prussian batteries with the main body guard, and drove the three beside their comrades of the advanced guard, and the nearest themselves the enemy. Meanwhile, as usual, the artillery of the nearest battery of its advanced guard soon occupied the position near Tronville, taking the place of part of the Horse Artillery which was pushed on close to Vionville. After a few rounds they again pressed at skirmishers, reconquered Vionville, and pushed through the village against the guns. The two batteries closest to draw back surviving no friendly infantry near them, were ordered to draw back under cover of the hill; but Müller's battery—one of those which had moved up close to the village and came into action under a heavy fire,

several horses being killed or wounded. "Swarms of skirmishers again rushed out from Vionville, and the moment became critical. The battery had recourse to case, and succeeded in driving the enemy back into the village; but as the close and biting musketry fire continued to make many casualties, it retired some 300 or 400 paces and took up a fresh position." So here we have an example of batteries quite unsupported by infantry, yet holding back large forces of the enemy's infantry. However, the French continued to gather in swarms, and the artillery had to fight a delaying action, retreating here, advancing there, till the Prussian infantry came up.

After this, and throughout the battle, the guns continually checked the advance of French bodies of troops, while on the other hand it is remarkable that they often suffered greatly from the fire of infantry at 1,200 to 1,600 paces.

It is sometimes said that the fire of artillery has little physical, but only moral effect. Let me quote a paragraph from Hoffbauer's account, later on in this battle:—"Two dense columns of infantry, issuing suddenly from buildings to the north-east and south-east (of Flavigny), were shelled by the whole of the batteries at a range of 1,500 or 1,600 paces, and retreated to Rezonville, leaving the ground literally covered with corpses, while strong French columns, which advanced from the hill to re-occupy the village, shared the same fate." Next day the neighbourhood of Flavigny was strewn with bodies of men, and of a large herd of cattle, which had fled from the farms, torn and mangled by shells.

It is not my business to describe this or any battle, only to give you a few suggestive incidents. We find Captain Müller *withdrawing* his battery some 200 paces, so as to bring it *into line with the skirmishers of infantry*, which had already retired. Again and again we find artillery pushed forward within short distance of the enemy to disengage exhausted or overwhelmed infantry. We find a battery coming successfully out of a struggle in which it lost so much from the fire of mitrailleurs that "two guns were rendered temporarily useless by want of gunners, and three guns lost so many horses that they could not be moved." When Wedell's Infantry Brigade advanced from Mars la Tour, and lost 65 officers and 2,600 men out of 85 officers and 4,500 men—more than half its strength, being utterly overwhelmed by numbers—the three supporting batteries had to risk everything to extricate the infantry. Two of them held their ground till the enemy's infantry were actually close to the muzzles of the guns. They were saved in their turn by gallant charges of cavalry. But they were saved!

During the latter portion of the battle, nineteen batteries (114 guns) held the line between the Bois de Vionville and the high road beyond Flavigny, supported attacks, and always checked pursuit, because so long a line can play at once on the front and flanks of the advancing enemy. Remembering how overmatched the Germans were in numbers, it is not surprising to find that the casualties were so numerous that "drivers, and even officers, had to work the guns, some of which had temporarily to cease firing for want of gunners."

the enemy, and opened fire to extricate the infantry. The result is thus stated in his own words:—

“The enemy’s columns suddenly disappeared, and their place was taken by long lines of skirmishers, one behind another; mitrailleurs and guns also opened fire. For a few minutes the battery was exposed to a heavy fire from skirmishers in the vineyards of La Planchette, adjoining the defile of Montoy, but opening fire with case at 400 paces, it cleared the ground.”

The losses of the battery were considerable. Three Officers were wounded, and all the Officer’s horses but one killed or wounded; but the desired effect was produced and the battery continued in action throughout the day. Its losses in this action in killed and wounded were 29 Officers and men, and 28 horses. The total combatant force of a Prussian battery is, or was then, 66 Officers and men, and 48 horses.

The total artillery losses in the battle were 138 Officers and men, and 158 horses. The damages to material were only one gun-carriage, one limber, and three wheels broken, though the ground was often dangerous to travel over.

You will find the scanty losses of material compared with men and horses a very marked feature of artillery combats, quite sufficiently marked to base tactical reasoning upon as I shall do hereafter.

Mars la Tour, Vionville.—The battle of Mars la Tour or Vionville on the 16th August was, like that of Borny, undertaken to check the supposed retreat of Bazaine’s army from Metz to Verdun. The Germans were not aware that the French had four Corps close at hand, though we cannot be sure that such knowledge, if obtained, would have materially altered their tactics. Their faith in attack is profound, and the French army had to be held fast at all hazards to prevent its junction with MacMahon’s retreating columns, and the troops assembled at Chalons.

The battle commenced by the arrival of the advanced guard of the 5th cavalry division near Tronville. Its battery immediately opened fire on hostile cavalry near Vionville. Some of the French cavalry were watering their horses, and the streets of the town were full of baggage. The result was a panic. A French battery presently replied. The three Prussian batteries with the main body rushed on to range themselves beside their comrades of the advanced guard, and drove back the enemy. Meanwhile, as usual, the artillery of the nearest Infantry division was ordered forward by the Corps Commander, and the battery of its advanced guard soon occupied the position near Tronville, taking the place of part of the Horse Artillery which was pushed on to the hill at Vionville. After a few rounds they again pressed on close to Vionville; but the French now advanced with swarms of skirmishers, reoccupied Vionville, and pushed through the village against the guns. The two batteries closest to the village having no friendly infantry near them, were ordered to draw back under cover of the hill; but Müller’s battery—one of those which had come forward from the infantry division, and was now not far off—moved up close to the village and came into action under a heavy fire,

several horses being killed or wounded. "Swarms of skirmishers again rushed out from Vionville, and the moment became critical. The battery had recourse to case, and succeeded in driving the enemy back into the village; but as the close and biting musketry fire continued to make many casualties, it retired some 300 or 400 paces and took up a fresh position." So here we have an example of batteries quite unsupported by infantry, yet holding back large forces of the enemy's infantry. However, the French continued to gather in swarms, and the artillery had to fight a delaying action, retreating here, advancing there, till the Prussian infantry came up.

After this, and throughout the battle, the guns continually checked the advance of French bodies of troops, while on the other hand it is remarkable that they often suffered greatly from the fire of infantry at 1,200 to 1,600 paces.

It is sometimes said that the fire of artillery has little physical, but only moral effect. Let me quote a paragraph from Hoffbauer's account, later on in this battle:—"Two dense columns of infantry, issuing suddenly from buildings to the north-east and south-east (of Flavigny), were shelled by the whole of the batteries at a range of 1,500 or 1,600 paces, and retreated to Rezonville, leaving the ground literally covered with corpses, while strong French columns, which advanced from the hill to re-occupy the village, shared the same fate." Next day the neighbourhood of Flavigny was strewn with bodies of men, and of a large herd of cattle, which had fled from the farms, torn and mangled by shells.

It is not my business to describe this or any battle, only to give you a few suggestive incidents. We find Captain Müller *withdrawing* his battery some 200 paces, so as to bring it *into line with the skirmishers of infantry*, which had already retired. Again and again we find artillery pushed forward within short distance of the enemy to disengage exhausted or overwhelmed infantry. We find a battery coming successfully out of a struggle in which it lost so much from the fire of mitrailleurs that "two guns were rendered temporarily useless by want of gunners, and three guns lost so many horses that they could not be moved." When Wedell's Infantry Brigade advanced from Mars la Tour, and lost 65 officers and 2,600 men out of 85 officers and 4,500 men—more than half its strength, being utterly overwhelmed by numbers—the three supporting batteries had to risk everything to extricate the infantry. Two of them held their ground till the enemy's infantry were actually close to the muzzles of the guns. They were saved in their turn by gallant charges of cavalry. But they were saved!

During the latter portion of the battle, nineteen batteries (114 guns) held the line between the Bois de Vionville and the high road beyond Flavigny, supported attacks, and always checked pursuit, because so long a line can play at once on the front and flanks of the advancing enemy. Remembering how overmatched the Germans were in numbers, it is not surprising to find that the casualties were so numerous that "drivers, and even officers, had to work the guns, some of which had temporarily to cease firing for want of gunners."

Most of the teams were reduced to two horses. Yet they were not driven back, and in the evening some of these batteries were actually sent forward to attack. It was so dusk that at 100 paces enemies could not be distinguished from friends. More than once they blundered into the presence of the enemy, and saved themselves by shell or case.

At the close of the battle the artillerymen were for the most part exhausted, many of the men being almost blind and deaf. Most of the guns were very foul, and several instances of shells jamming in the bore had occurred in consequence.

The losses in killed and wounded were 42 Officers, 685 men, 1009 horses,¹ an average of one Officer, 18 men, and 38 horses per battery—that is to say, more than one-fourth of the men and more than three-fourths of the horses. One battery lost 4 Officers, 42 men, and 50 horses, or about three-quarters of its Officers and men, and more than its complement of horses.

The losses in material were quite insignificant—one gun carriage, 5 limbers, 8 wheels, a pole, and an axletree seat damaged. They had fired about 20,000 rounds, of which 19 were case. Want of ammunition was often experienced.

The ranges were various, from more than 4,000 paces to 800 frequently, and more than once 300 or 400 paces. The enemy often advanced under fire to within 800 or 900 paces, say, 700 yards, but were almost always checked at about that range. And the instances of short ranges generally occurred at decisive moments, when no attention could be paid to cover.

Gravelotte.

The battle was commenced by the IX Corps sending on through Vernéville the artillery of the 18th Division and the Corps Artillery, escorted by two squadrons of the 6th Dragoons, to the hill beyond the valley N.E. of Vernéville, within effective range of the enemy, who were near Amanvillers. The battery of the advanced guard pushed on and opened fire from near the road N. of Vernéville, but shortly after the Divisional Artillery came up at a trot (not Horse Artillery, mind,) and, crossing a rather difficult ditch at a gallop, came into action 1,000 paces further forward, and fired at hostile batteries to the west and south of Montigny la Grange. Presently the Corps Artillery came up at a trot, and ranged itself on the left of the Divisional Artillery, along the hill between Vernéville and Amanvillers. The enemy replied from batteries under cover, mitrailleurs, and infantry fire, at 1,000 paces, pushing forward skirmishers even closer. The fire was so hot that the escorting two squadrons of dragoons were sent back to Vernéville. Many Officers and men fell, but the guns retained their position, and drove back the French infantry.

Now, the left of the line had been pushed so far forward, acting on the supposition that they had only the right wing of the French Army to deal with, that it soon found itself under fire from French Artillery

¹ Fighting strength, 66 officers and men, 48 horses.

and mitrailleurs on the left and in rear. The left battery, Werner's, retired a few paces, wheeled outwards, advanced 200 paces, and opened fire in reply. But in less than half an hour it lost two Officers, three-fourths of the men, and all the horses except eight. It had, however, silenced the enemy's mitrailleurs at a range of 900 yards, when suddenly a French battalion, which had been concealed in a near hollow, appeared close to the battery, "like figures on a stage." There was no time to fire even with case. Only eight horses were unwounded, yet Captain Werner saved two of his guns. The French battalion pressed on to the flank of the next battery, whose commander, occupied with his own struggle, had not perceived the fate of Captain Werner's battery. As soon as he felt the fire of the chassépôts, he turned his guns upon the French battalion and disengaged himself, by firing shell at close quarters. Deciding on instantaneous retreat, he saved all his guns and left only one limber on the field, all its team having been killed. Of course he suffered severely, "unexampled loss," Hoffbauer calls it.

Now, Gentlemen, here are two batteries surprised by infantry at close quarters. They are entirely without support. In one case all the horses but eight and three-fourths of the men are already killed or wounded. This battery carries off two guns. The other battery suffers great losses but carries off all its guns.

Then German infantry arrived and the rest of the batteries were ordered to withdraw one by one to make good their losses. This they did "with reluctance." Two went and the next one was attacked by French infantry at 400 paces. It fired case, checked the enemy, and under command of a lieutenant, followed the rest. Horses had to be sent for from waggons for the next battery, and infantry fired on it in flank and rear, the German infantry—a battalion pushed forward after a time to help the guns—*having retired through it*. Two of the guns sustained such losses in limbering up that they could not move with the others. A lieutenant remained with them and brought them off after some further loss. Twenty-seven Artillery Officers had been killed or wounded in this affair, others had lost horses, one limber was blown up. Remember, this line of guns had been pushed right into the midst of the enemy. French infantry and mitrailleurs were in front, on both flanks and in left rear. It was a Balaklava Charge, with artillery instead of cavalry, yet all the guns were carried off except four from the left battery, which were actually among the enemy, and only two were permanently retained by the French. But for lack of horses at a critical moment, not a gun would have been lost. To show the severity of the French fire at this time, it may be sufficient to say, that the German fusilier battalion, sent to extricate the left wing of the artillery, lost in twenty minutes more than half its numbers and had to retire.

On the other hand we read that when the Saxon corps were advancing, after the storming of St. Marie aux Chênes, two batteries which were pushed forward, "sustained considerable losses from the "enemy's artillery, and especially from swarms of skirmishers which "had ensconced themselves in the folds of the ground towards Ran-

"court." Two Officers were wounded, two guns very soon lost all their horses and nearly all their gunners. The batteries retired but came into action a little further back.

After all the Saxon artillery were in position, the enemy made repeated attempts to dislodge them as well as other portions of the German artillery, which were now massed in the neighbourhood, but the value of large masses of guns now became apparent. Whatever point the French selected to attack, their way to it was not only covered by the direct fire of the guns against which their assault was directed, but also by the flanking fire of other parts of the great artillery line. Hoffbauer says, "as a rule the ranges varied from 1,800 to 3,200 paces, but they were often much shorter, as for example, when the enemy's skirmishers, advancing against our front to within 800 paces, were completely stopped by the German shells."

Speaking generally of the artillery pushed on in the early part of the battle, Hoffbauer tells us, that "the principal losses were caused by the chassépôts of skirmishers, who lay under cover in the furrows, as well as in the ditches of the high road."

Towards the right of the German position the first Army massed 156 guns, with the fire of which it completely crushed all efforts of the French to advance, and became so emboldened that it attempted to push both infantry, cavalry, and artillery through the defile of Gravelotte, not understanding that immense masses of the enemy commanded by their fire both the defile itself and the exit from it. Some batteries got through with loss, but found themselves in a perfect hornet's nest of Frenchmen. I cannot forbear giving you a rather long extract, relating the fortunes of one of these batteries. The order for it to advance was a mistake, but the conduct of the battery is worthy of immortal honour. Three Officers had been wounded, all the Officers' horses had been killed, and the battery had suffered enormous losses.

"But in spite of the losses both in men and horses, which increased from moment to moment, the battery not only bravely held its ground, but also maintained its fire with great effect. Shells were thrown at from 700 to 900 paces, against hostile skirmishers in the hollow road, and at 1,100 paces against Moscou, as well as at shelter trenches and mitrailleurs east and west of that farm.

"Perceiving the desperate situation of the battery, Lieut.-General Von Schwarz sent his Adjutant through the storm of bullets with an order for it to withdraw across the defile. But so many horses had already been disabled that the battery could not be moved, and Captain Hasse affirmed that death was preferable to leaving the position unnecessarily. The firing was therefore continued, till at length but one gun could be served, and that by four men only; for all the gunners of the other detachments were either killed or wounded. The ammunition of its own gun-limbers, as well as that of a limber of the fourth light battery, was exhausted, and there was no more at hand, the lines of waggons not having been able to pass the defile."

At this moment the Divisional Commander arrived with three waggon teams, and repeated the order to retire.

"Having refitted under fire, as far as was absolutely necessary, the battery then retired through the defile, its limbers riddled by bullets, the drivers on foot, the guns drawn by two or four horses, and closely packed with the severely wounded. The movement was made at a walk, and further losses were sustained. Major Coester (the Divisional Commander) had a horse killed under him; the last gun was suddenly reduced to one horse, and, heavily laden with wounded men, was obliged to halt for assistance. The battery was received at Gravelotte with a loud hurrah, and General Von Schwarz embraced the Commander with emotion in the presence of the troops. The retreat of this heroic battery was a triumphant march in the real sense of the word."

Another of the batteries which had crossed, though suffering heavy losses, was partially protected by a low wall, and was able to hold its ground. Its only supports at first were some weak detachments of Infantry, and though further reinforcements were sent, they were invariably cut to pieces as soon as they reached the dangerous point by the tremendous fire to which they were exposed!

After a time the French advanced in force, driving before them hundreds of stragglers from different German battalions, who had been in or about Saint Hubert. These runaways rushed through the battery crushing men and horses together, and obscuring everything by clouds of dust. "Captain Gnügge, utterly powerless, saw part of his battery swept away in the general confusion; and when the turmoil was over, three guns without limbers, and another unhorsed, limber, were all that remained of the battery in its original position. Collecting, however, a few gunners and infantry men, about thirty in number, he opened fire with case at a distance of from 300 to 500 paces on the pursuing skirmishers, and repulsed them." This battery remained in its position until darkness made it impossible to lay the guns.

During the first attack of the Guard upon St. Privat, the Germans succeeded in seizing a part of the hill with a detachment of the 4th Brigade, which was presently attacked by strong columns from Amanvillers. The important point was in danger of being lost, and there was a great longing for the support of artillery. "But the cry from the hill for support had already reached the 2nd Battery of the Guard. Without waiting for orders it advanced up the slope, and coming into action near the hard-pressed infantry, maintained the important point against all attacks. In its advance three guns were temporarily left behind, one of them having lost all its drivers. In this position the battery fired on the hostile columns and skirmishers at a range of 800 paces with such effect that they were compelled to halt." But time would fail us were I to attempt to describe all the striking incidents of the action of artillery in this remarkable battle. We can only notice further two or three important facts.

The artillery was as usual employed with great boldness and in

masses. The First Army had at one time 28 batteries—168 guns under the same command, and in the same position. The final assault on St. Privat was prepared by the fire of an encircling mass of 186 guns, to which four batteries were added at the commencement of the assault, so that there were at that moment 210 guns concentrating their fire on the devoted position.

After the capture of St. Privat, the artillery pushed on to hold the advantage gained. Thus was formed by degrees the last great artillery mass extending from the Forêt de Jaumont by St. Privat to the Bois de la Cusse, in which mass, finally, 38 batteries (228 guns) were crowded together. The right wing of this force—about half the batteries—by its flanking fire, without any infantry attack, constrained the 4th French corps first to change front, and then to retreat.

The ranges in this battle varied between 4,000 paces (in one case 5,000) and 800 paces, for we may consider as exceptional the few rounds of case occasionally fired at close ranges.

The losses of the artillery amounted to 988 Officers and men killed and wounded, and 1,563 horses.

They had fired 34,680 rounds, of which 20 were case.

The casualties to material—besides the 2 guns taken by the French—were:

2 gun carriages, 5 limbers, 2 limber boxes, 16 wheels, 3 breech pieces, and 1 elevating screw.

Such a list appears ridiculous, but losses of material are always trifling compared with the number of men and horses killed and wounded.

Sedan.

Near the beginning of the battle, the German official account says:—

“The artillery had taken part in the engagement side by side with *the foremost detachments of infantry.*”

Here we have the usual pushing on of the artillery at first; but listen to what comes later:—

“The artillery position of the 2nd Bavarian Corps at Frénois had been reinforced by the Crown Prince’s order, at 1 o’clock, * * * so that 71 German batteries—426 guns in all—combined their fire from three different sides upon the French Army, which was now crowded together in a confined space. (In the north, 14 batteries of the 11th, 12 of the 5th Corps; in the east, 15 batteries of the Guard Corps; 7 Saxon and 2 Bavarian on the left bank of the Gironne; 4 batteries of the 8th Division and 6 Bavarian batteries west of La Moncelle; in the south, 11 batteries of the 2nd Bavarian Corps in the ground between Wadelincourt and Villette). Not only their batteries and foremost lines of infantry, but also their reserves moving backwards and forwards, and the masses of cavalry vainly seeking cover, were overwhelmed with such an iron hail, that they fell more and more into disorder, and found their power of resistance well nigh broken before they were even able to engage in the struggle. The fate of

"the battle was already, to a certain extent, decided by this deployment *en masse* of the German artillery, even without the further advance of the infantry."

A little later, the official account says:—

"And so annihilating was the fire of the artillery, that the French were scarcely capable of any organized resistance, when the German infantry, towards 3 p.m., moved forward from all sides against the wood."

Again:—

"But before these measures could come into operation, the already enfeebled strength of the enemy was utterly broken by the annihilating fire of the German artillery. The French Commander-in-Chief, from his position at Balan Church, saw the troops which he had brought forward gradually melting away."

In the general retrospect of the battle, the official account speaks thus of the artillery work:—

"The German artillery, in the battle of Sedan, produces an especially grand and decisive effect. Only the surprise, undertaken during the morning-mist towards Bazeilles, as demanded by this sort of attack, is made by the infantry alone; but at all parts of the extensive battle-field the whole strength of the batteries was from the first brought into play. Inserting themselves in the columns of route in a position favourable to early deployment, they hastened forward to the battle-field *with the advanced parties of the infantry*. The batteries of the 11th and 5th Army Corps, which have to traverse the difficult road defile at the Bois de la Falizette, deploy, trusting mainly to their own strength, in one long line, though opposed to the hostile masses of horse threatening them, and with their backs to the Belgian frontier. As a general rule, the attack of the infantry is deferred until the artillery has produced its full effect. From the Calvaire d'Iilly, the enemy is almost exclusively driven off by the fire of the guns, whereupon a few companies take possession of this important height without a struggle. The shells bursting thickly in the Bois de la Garenne prepare the attack of the battalions of the Guard, and spare the tremendous losses with which previous victories had been purchased."

Pray remember, that this is not written by an artillery officer. It is the voice of Von Moltke, speaking through the historical section of the General Staff.

Let us now try to gather together the main lessons to be learned from these battles.

The artillery was as a rule pushed forward in advance of the infantry, with the object of gaining time and establishing a superiority of fire early in the battle, so that the infantry should suffer as few losses as possible, and not be delayed longer than necessary before attacking. This was done in every case, whether the enemy were superior or inferior in strength.

We find the artillery always able to hold its ground when attacked by infantry in front in any formation, even as skirmishers, but suffering terribly, and sometimes obliged to retreat from infantry lying down

behind cover, or in folds of the ground. In such cases there was always felt the want of some troops fitted to dislodge the annoying skirmishers.

Good work was done at both very long and very short ranges, from 4,000 paces (about 3,200 yards), down to 300 or 400 paces. Whenever it was possible, the batteries closed to 1,000 or 1,500 yards, but frequently the nature of the ground, or their position on the flanks of long lines, prevented anything like near approach to the enemy.

The shortest ranges for offensive purposes varied between 1,200 and 800 paces.

The artillery on several occasions broke off from the fight in which it was immediately engaged and made flank marches in presence of the enemy. But here we must remember that the French artillery was decidedly inferior.

Whenever it could be done, the batteries were massed in long lines, under the fire of which nothing could continue to exist in formation, and this habit became more fixed as the Germans gained experience.

The losses were almost entirely in men and horses; the batteries continued in action at the same place after extremely heavy losses, and, if too hard pressed, succeeded in carrying off their guns.

Guns sometimes held their ground when infantry had to retire. We shall come to the reasons for this hereafter.

There are no means of ascertaining the actual losses of the enemy by artillery fire. If we could know them, they would be found trifling compared with what they will be in the next war, for the Prussians had no shrapnel, only common shells, and no range-finders. Their guns were not so powerful as ours, or as theirs are now.

Since the war of 1870, artillery has made certain definite advances. We shall see the effect of them the next time two great nations take up arms. Meanwhile, for want of actual war, we must get what light we can from the experimental practice carried out from time to time. We have gained some valuable facts from the practice at Okehampton. Let us examine them for a few moments.

Experiments at Okehampton.

We need not spend much time over these experiments, but we shall never understand each other unless we agree, or nearly so, as to the amount of practical decisions we have the right to deduce from such trials. And first we must clearly separate the work on Dartmoor from that usually carried out at the Shoeburyness experiments, about which we sometimes read in the papers. The experiments I am speaking of at Shoeburyness are undertaken to try the actual power of a gun or a projectile under certain definite conditions. They are purely scientific, and as the astronomer must have his instruments marked and moved with the extremest accuracy, as the chemist must weigh his simple or compound materials to the thousandth part of a grain, so must the scientific gunner spend much time and trouble in obtaining accurate results on which to base his calculations.

At Okehampton, on the contrary, every endeavour was made to bring the conditions as nearly as possible like those of war, always

remembering that the fire of the enemy cannot be imitated. The ranges were not measured by any other means than those which will, I am glad to say, soon be in the possession of every battery.

The fire was sometimes rapid, sometimes slow and deliberate, as it would be in war. The ground was very rough. The batteries came into position at all sorts of paces, and sometimes the targets were so placed as to be all but invisible; or, what is worse, they stood out against the sky-line in such positions that shells passing over them burst at unknown distances. The batteries were not selected nor specially trained for the purpose. Do not imagine that there was any desire to make the best of the occasion for magnifying the power of artillery. Such an attempt would have been as unworthy as it would have been futile under the experienced eyes of many critics. And, in the details I am about to bring before you, trifling hits are not counted as disabling men. We will only take a few examples to illustrate the power of guns at different ranges. To compare them mentally with the ranges of the German guns in actual battle, we need only remember that the length of paces to yards is about as 4 to 5, so that 4,000 yards and 5,000 paces are nearly equal. I take the 16-pounders in all cases, because the 9-pounders of the Horse Artillery were new guns which had not yet received their proper tangent-scales.

At 4,000 yards against a small cavalry column (represented by targets) 53 yards deep, using percussion shells in all cases:—

6 water-shells fired as a salvo gave	48 hits.
6 shrapnel	140 „
12 water-shells fired independently	165 „
12 shrapnel	189 „

Total 36 rounds and 542 „

At 3,000 yards against a body of infantry, about 400 hundred men, supposed to be in reserve, and represented by the famous dummies, 18 shrapnel with time-fuzes disabled 109 men.

So far the dummies were standing. Now for a crucial test.

At about 2,000 yards (1,950), the dummies being so placed as to represent a half battalion of infantry in two lines, the first line kneeling and making every use of cover, some of the men hidden by rocks, the second line *lying down* 50 yards behind the first:—

36 shrapnel with time fuzes disabled 44 out of 103 in the first line, and 6 of the second line lying down.

At 2,000 yards against targets representing 288 mounted cavalry soldiers in column of squadrons, the frontage being 36 yards and the depth 53:—

In nine minutes 36 water-shells gave.....	3,892 hits.
In five „ 36 shrapnel „	1,574 „

disabling in the first case 186, and in the second 131 men.

Many of the hits were not deadly; but, on the other hand, many of the men were killed over and over again by different shells. Each of the squadrons was severely hit, and at all heights from the ground, so that a column of infantry would have suffered equally.

I need not trouble you with the effect at the ranges generally supposed to be best for artillery—namely, between 2,000 and 1,000 yards—but come at once to short distances.

A battery under some cover was supposed to be attacked by infantry advancing from 1,000 yards to 100. At 1,000 yards only the first line of 100 men in open order and supports about the same number, came under the fire of the battery, and were allowed four minutes to advance 400 yards. They could not have moved faster, for, in the four minutes, the range being always 1,000 yards, the projectiles, shrapnel with time-fuzes:—

71 men out of 100 were disabled in 1st line

24 " " 2nd "

It may be said that men moving would have been more difficult to hit. But this is not the case, because shrapnel at short ranges covers with its shower of bullets a large depth—400 or 500 yards, so that to have the true range is of very minor importance so long as it is not taken too long.

The infantry were then supposed to be at 600 yards, and in two lines, about 150 to 160 in each line, always with open files, rank entire; and the artillery detachments were reduced by 3 men each to represent losses—a liberal reduction. Shrapnel was again fired:—

In two minutes 98 were disabled in 1st line.

" 36 " 2nd "

Again the range was shortened to 400 yards, and there was a further reduction of 2 gunners per detachment. Shrapnel were fired:—

In two minutes 117 men were disabled in 1st line

" 39 " 2nd "

The infantry had now lost 385 men out of 400 in eight minutes.

At 200 yards only one line was supposed to exist, additional men having come up from some other force. The battery fired case—another gunner having been removed from each detachment:—

In one minute 81 men were disabled out of 156.

The range was then reduced to 100 yards. Shrapnel were used, but put into the gun reversed, so that their percussion fuzes were next the cartridge:—

In one minute 113 men were disabled out of 156.

Thus, at short ranges from 1,000 yards to 100, the infantry never showing more than from 200 to 300 men in open order, and latterly much less:—

In ten minutes firing 579 men were killed or severely wounded, many of them struck over and over again at the same range.

Taking into consideration the whole of the experiments I have put before you, is it too much to say that the fire of an English battery of the present day (and we hope soon to outdo all this) begins to be effective at about 4,000 yards, is very powerful at 2,000 yards, and may be said to be annihilating to troops in any formation at 1,000 yards and under. The ground must of course be supposed to be moderately open.

The question then arises, what would the infantry have done against the guns? Well, Gentlemen, we are not left entirely without knowledge on this point also. Last year (1875) certain experiments were conducted in India, among which not the least interesting were the attacks of infantry against guns in shelter-pits, and I will give you the results. But let us bear in mind that the infantry also had no enemy firing at them.

On the 25th of February, 40 men of the 48th Regiment were placed at 800 yards from two gun-pits, containing imitations of guns and dummy gunners, all posted as serving their guns, whereas in reality the men would have been more than half the time under cover, to say nothing of the cover afforded by smoke. The infantry fired for five minutes :—

Result.—Three men hit in each gun-pit.

On the 13th of March, 40 picked marksmen from the 76th and 107th Regiments fired for five minutes at two guns in pits. The men selected their own positions, about 750 yards from the guns :—

Result.—5 men hit in one pit, 0 in the other.

On the 25th of June, 40 men of the 45th Regiment fired at two guns in pits for five minutes. Range unknown, afterwards ascertained to be 770 yards :—

Result.—1 man hit in one pit, and 0 in the other.

On the same day the experiment was repeated, the 40 men being in skirmishing order. The range is not given in the official report, but I suppose it was the same as before—770 yards :—

Result.—3 men hit in one pit, 2 in the other.

These results give us an average loss of 2 men per gun in five minutes, and show that the reduction of 3 men per gun made in the Okehampton experiments to represent the effect of fire from infantry advancing from 1,000 yards range to 600 in four minutes, was rather over than under estimated, especially as the first line would have lost three-fourths of its strength. Remember that not more than a few men at a time can see the gunners if they have any cover.

Here we have to face the great question of the comparative physical and moral power of infantry and artillery, and the moral effect produced upon one or the other arm by equal losses.

Before attacking this subject, permit me to say that, in my humble opinion, the principal arm, the mainstay of an army, is, as it has been and must be long after our time, the Infantry. It is the easiest trained, the cheapest to place in the field and to keep there, the only arm which is equally powerful at rest or in motion, the most easily concealed, the simplest in its armament and use. Only infantry can decide battles and secure the ground won. Whatever may be the increasing value of artillery, it can never supply the place of a single infantry soldier. But, on the other hand, the value of artillery has grown greatly of late years.

If the guns are of no use when in motion, their long range renders the necessity for their moving much less, and their mobility shortens the period of weakness. To get the full benefit of that range we need two additions. The first is the range-finder, which is at last adopted

in the service ; the second is the telescopic-sight, a specimen of which has been brought forward by Lieutenant Scott, of the Engineers, to whom we should all wish good speed in his endeavours to introduce it. The regularity of range noticed at Okehampton was secured by a very simple arrangement, which there is no need to publish to all the world, and we have reason to believe that the flatness of trajectory, and therefore the effect at all ranges, is in a fair way towards making another considerable step in advance.

We may, therefore, take 4,000 yards as a practicable range for field-artillery. This means that a gun in action under favourable circumstances covers with its fire about 7 square miles of country, and can change its object from one point to another more than 4 miles distant from the first, by a simple movement of its trail. In other words, a column of the enemy on the right flank may be hit, and within a minute another column on the left flank, more than 4 miles distant from that at which it originally fired. Such opportunities are, of course, exceptional. No other kind of mobility can approach this. If the guns cannot fight in motion, there seems little need for them to do so.

Since 300 or 400 yards difference in range now matters little to artillery, the guns have a larger choice of positions than infantry in ordinary cases, so that they can generally find fair cover. Moreover, because they need not move much, they can make more use of artificial shelter. From such shelter they can act either offensively or defensively ; whereas infantry must move out of its cover to attack, and cavalry can only attack by exposing itself completely.

This quietude of artillery enables it to find the range of its mark accurately and to fire steadily. The place where its shells burst can be seen, and the range corrected accordingly if necessary. No infantry soldier can tell whether his bullet has gone over or under the enemy, or struck the mark.

The fire of infantry is the collective fire of individual men, and depends for its steadiness on the nerve of individuals. Hands will tremble and bullets go astray after a rapid movement, even if the soldiers are not under fire. When to this is added the nervous excitement caused by the bursting of shells in front or in the ranks, and the sight of huge gaps made in the line or column, there cannot be much doubt that the average steadiness of nerve, and, therefore, the average firing must be very small compared with the steadiness of the same men on the practice-ground during peace.

The fire of artillery is not governed by the average steadiness, but by that of officers and sergeants, and less steadiness is required to lay a gun than to hold a rifle straight with its sight properly raised. How often, think you, would a man look to his sight when advancing under such fire as guns can now produce ? Guns have no nerves to be shaken, and, the proper orders being given, aiming and firing is as much a matter of routine as marching. Fifty shells bursting in a battery will not shake the accuracy of a single gun, if once properly laid.

I hope you noticed how in the battles before Metz the artillery held

its ground sometimes when the infantry had to retire. You know the rule that the loss of one-third is supposed to be about as much as infantry can bear without retiring. Some of the German batteries lost three-fourths of their men, and yet held on and fought their guns. There was no difference in the men themselves. What was the reason? Simply this, that the guns did, as they always will if we let them, act as anchors to the gunners. Think how much trouble is necessary before a battery can retire. Somebody must take the initiative of giving the order, which must be repeated from month to month. Then the drivers have to perform a complicated movement, if indeed they are not under stress of difficulties because they have horses falling wounded in the midst of the teams. Next, the gunners must attach the gun to the limber—limber up, as we call it. Only then is the battery as well able to retire as infantry always is. The gun is, therefore, a moral anchor to the gunners.

But it is more than this. Each gun is the rival of its companions in the battery. In peace its gunners have cherished it. They have, in good-natured rivalry, struggled to make it first in beauty of polish and paint for itself and its carriage. They have striven to hide its defects and glorify its virtues. Gentlemen, they have called it *she*—need I say more?

Well, then, this “*she*” is not easily deserted, and as a gunner has no other arms, he fights his gun to the last moment. Without her, he is disarmed and helpless; with her, no matter how many of his comrades are disabled, the power of fire is almost as great as ever. And *she* remains there as steady as a rock, always throwing defiance in the enemy's face. Surely it is not difficult to see why a battery should hold its ground, if we will only let it, if we don't teach the gunners to count the preservation of their guns as an end instead of a means.

But the guns possess a quality which Nature has mercifully denied to female creatures generally—that of increasing their individual strength by combination. The effect of the guns is greatly increased by their employment in masses.

Take, for instance, the cavalry experiment at Okehampton, the model of which is before you. The effect was produced by 36 rounds of water-shell in nine minutes. Meanwhile, after the first six shells the troopers might have dispersed or galloped under cover. Had six batteries been there, the same or greater physical effect would have been produced in an instant of time, and the moral effect would have been overwhelming.

A battery of 100 guns would, roughly speaking, occupy about a mile, and in former days a mile was a long range for guns. But now a line two miles long might fire easily at the same object, and the guns at one end could protect those at the other by flanking fire. Therefore every increase of range lends a new argument to the advocates of massing tactics.

But I cannot find, either in reason or experience, any proof of a proposition which has lately been brought forward by an able writer on defensive tactics—namely, that the guns should be placed some 400 yards behind the infantry. If all the experience of the last war will

not suffice to dispel the idea, neither will Napoleon's maxims, which, however, may come to our aid. He lays down the rule that artillery can defend its own front in these words:—

“No infantry, however brave, can with impunity march 1,000 or 1,200 yards against a strong battery of artillery well placed and well served; before they could accomplish two-thirds the distance, these men would be killed, wounded, or dispersed.”

And again:—

“Artillery should always be placed in the most advantageous positions, and as far in front of the line of cavalry and infantry as is possible without compromising the safety of the guns.”

All my pains will have been in vain if the impression remains in your minds that artillery is a thing to be protected and kept out of reach of harm. If you treat it so, it will be nothing but an incumbrance to you. Like the queen at chess, it is either a source of great strength or weakness, according to the way we use it.

Let us now try to gather our floating ideas into a few definite principles. As for details, they must vary according to circumstances.

1st Principle.

Since field artillery can move at a trot, and its fire is of great value at all stages of a battle and at all ranges, a general should endeavour to obtain a superiority of artillery as early as possible. To gain this, his whole or nearly his whole force of guns should be pushed well forward and massed at the beginning of a combat, so that it may crush the enemy's artillery in detail as the latter comes into position.

2nd Principle.

Whether acting offensively or defensively, artillery can protect its own front in ordinary open country, and should not retire before infantry unless the whole force is retreating.

3rd Principle.

But artillery can be sorely annoyed, or even caused to retire, by the fire of infantry skirmishers, well concealed in folds of ground or behind walls and trees. Therefore infantry should not attack in any formation, but, so to say, stalk the guns. And, this being granted, infantry should *always* attack guns; who knows but that they may be unsupported?

4th Principle.

The only reply to such hidden attacks, early in the battle before the friendly infantry has come up, is by the use of dismounted cavalry; or, better still, by mounted men trained to work on foot either as riflemen or gunners, and permanently attached to the batteries.

5th Principle..

Since artillery can take care of itself, provided its flanks are protected, a line of guns may be deployed, and behind it the infantry may effect turning movements to act on the enemy's flank. When such a flank attack is ready to be delivered, the mass of guns should concen-

trate their fire on that part of the enemy's line about to be assailed, till it is shaken.

6th Principle.

A system of signals should be devised and used, so as to enable a large number of guns to act simultaneously against the same point.

7th Principle.

When the infantry combat has commenced, as many guns as possible should be pushed close up to the enemy, say within 1,000 yards, or to that distance where they will find the best and nearest positions to the enemy.

8th Principle.

When artillery advances to close combat, a considerable number of men and horses should follow the batteries as near as they can consistently with keeping under cover. If this be done, there is no fear of leaving the guns in the hands of the enemy. At such moments, cover becomes a secondary consideration. Artillery, like infantry or cavalry, in close combat must count on heavy losses in men and horses, but they must determine to crush the enemy in that part of the field, remembering that "omelettes are not made without breaking of eggs."

9th Principle.

Since a frontal attack can be beaten off at any range, artillery, if it has a clear space of 1,000 yards in front of it and scouts on flanks, should not allow itself to be turned from its immediate purpose by the reported approach of large bodies of infantry. Such attacks may be neglected till the enemy comes within 1,000 yards.

10th Principle.

Range-finders, telescopes, and scouts are indispensable to the development of the full power of artillery; the same may be said of spare men, horses, and ammunition. The front line of the battery should have as few men and horses as possible, and should be fed from the rear, two or three times over if necessary.

But the great principle of all, and that which must underlie all minor ones, is that artillery has issued from its childhood and is as well able to shift for itself as any other arm. This does not mean that it is independent of the others, but that it is only dependent on them in the same sense that they are dependent on it. Cavalry should feel the way, and be ready afterwards to support the guns with the dashing self-devotion characteristic of its nature and history. The infantry should never forget that the guns in front may be sorely in need of the arm which can do everything but move quickly. Artillery is, after all, only preparing the way for the glorious strife of the foot-soldiers. The gunners are dying that the infantry may live and win the day. On the field of battle we are all brothers, and our only rivalry should be to try which can, at any sacrifice, do most for the common good.

The CHAIRMAN: Gentlemen, I think a discussion upon this very interesting subject would be of great use to the Army, who will read this lecture in various parts of the world. We have now heard the subject dealt with from an artillery point of view, and I have no doubt there are some infantry or cavalry officers present who would like to discuss Colonel Brackenbury's paper. I would especially call attention to the fact, that in the illustration Colonel Brackenbury has used with respect to firing at batteries, the guns were in gun-pits and it would not be always possible in action for artillery to construct these pits. I think it would be very advantageous if some cavalry or infantry officer present would be good enough to give us their opinions on the subject.

Major J. NORTH CREALOCK, 95th Regiment: I am not prepared to join issue in any manner with what Colonel Brackenbury has so ably told us, and I have great diffidence in offering any opinion. It seems to me, however, there is one little point Colonel Brackenbury has omitted to state with regard to the experiments at Okehampton, namely, how the guns were attacked by the dummy half battalion. Did the guns advance, or was the half battalion advanced? I am inclined to think the battery advanced. He told us that the front of the dummies representing mounted cavalry in column of squadrons was 36 yards, but what was the front of the half battalion of infantry? I do not think he stated that, because it makes a considerable difference if you box up a battalion of infantry into a compact formation. For it is evident, I think, that the losses which the infantry would experience under a more lateral formation would be considerably less. Although it is possible to move the guns, I doubt if you could the dummies, and I am inclined to think, if the batteries advanced and the dummies were halted, that a considerable difference would be the result. After listening to Colonel Brackenbury, I must say that I feel that I am rather sorry I am an infantry soldier, because I do not know what our *rôle* is to be in the future. He did, however, leave us one small loop-hole, for he said that although the front of the artillery is safe, the flank is not equally safe, and the only word of comfort is, that he admits in the battles he describes, there was sometimes a biting fire from infantry concealed in furrows and behind trees, so that, to use his own argument, I think there is still a future left for the infantry soldier. I think everything he laid down was done in a most fair way, and the result will be, I hope, that it will make us infantry officers a little more anxious to see what we can do to develop the usefulness of our branch of the service. It is quite true that, as he expressed it, the guns are a "moral" anchor to the gunners; but I go further and would add they are a "physical" anchor simply because they cannot run away, as it seems the horses are always shot. Speaking as a so-called "mounted officer," I suppose I may say our horses are likely to be shot also, and therefore we shall not be able to run away. I think on the whole, then, we are not in such a bad way as might be supposed, and that the future, for us, above all others, lies in Colonel Brackenbury's remark that "Infantry should always attack guns."¹

Colonel Lord WAVENEY: I have not the advantage of being either an infantry or a cavalry officer, neither have I the advantage of the general practice in field artillery which has been developed so clearly by Colonel Brackenbury on this occasion, but it seems to me there is one point which might be considered. I observe as regards the experiments at Okehampton against cavalry and infantry, the frontal attack which the Colonel has developed is the only attack supposed. I do not remember that he speaks to any extent of the infantry flank attack, except to disregard it; nor is any mention made of a combination which I cannot but think may be effectively formed of light cavalry and horse artillery. Reference has been made by Colonel Brackenbury to the use of cavalry on one occasion, where he speaks of the Germans remaining quiet under the observation of masses of the

¹ It may be questioned, perhaps, if the lecturer could have drawn the same conclusion, viz., advising boldness in pushing on artillery, had the French attacked in place of remaining on the defensive—when *they did* attack—the German artillery would appear to have been greatly compromised and had the fortune of a day's fight been in the favour of the French, it is difficult to see how the German guns could have ever been withdrawn.—J. N. C.

French horse. These troops were almost in line, and their movement could only be that of a frontal attack. I remember some years since reading a very clever work, written, I think, by General Smith, of Her Majesty's light cavalry, and edited, as I now learn, by an officer of the Royal Artillery, Lieutenant-Colonel Henry Brackenbury, in which he lays down as the principle of his operations the combination of the advance of horse artillery with light cavalry. The matter was reduced to a mathematical proportion, as indeed all these details should be, and it was there shown how in successive movements of artillery and cavalry, important ground might be won and maintained. I cannot but think it would be perfectly possible to develop Colonel Brackenbury's principle as to the use of dismounted cavalry by an application of mounted cavalry also. I suppose the application of a corps of cavalry trained something after the Cossack fashion. The peculiarity of the Cossack attack is this: that although the soldiers are disciplined and trained to act together, they work in "schwarm;" that is to say, in clumps of horsemen, with whom it is exceedingly difficult to deal in detail. They advance in masses and retreat in masses; and if this be borne in mind that it would be perfectly possible with light guns to make a flank attack on guns on a line of a mile long to envelope them by swarms of these light horsemen, and that it would be exceedingly difficult to disperse these horsemen, who would furnish the means of accumulating an overwhelming force of fire on the flank of this long line, it will be seen that if the guns were shaken in this way it would possibly effect a very serious loss on the flanks of the line of artillery. I may ask how long it would take to wheel up to a flank so as to resist a flank attack on so long a line? There is another point which struck me particularly in Colonel Brackenbury's remarks on the concentration of guns. He says, in the last great attack in the battle of Gravelotte after the capture of St. Privat, an artillery line was formed extending from the Forêt de Jaumont, to the Bois de la Cussey, in which 228 guns were crowded together. Now, I submit this to his consideration: whether, assuming the existence of a school of officers who were trained to this massing of guns and light cavalry, not light cavalry of the regulation class, but light cavalry trained to act in the Cossack fashion—whether guns accumulated in such masses would not be deprived of their usefulness by the very accumulation to which they are indebted for their great strength in resisting a frontal attack. This is a point which has occurred to me. I derived my idea from the work that I have referred to, and it has seemed to me that very possibly such a combination as was suggested in that work which I venture to introduce to your notice, might increase the very great power that has been so satisfactorily shown to be developed in our modern field artillery by Colonel Brackenbury, by enabling a power of attack in movement and resistance combined to be developed, of which, at present, we have not seen any examples.

COLONEL BRACKENBURY: I do not find much to reply to, as I am not aware that any strong criticism has been made upon what I have had the pleasure of bringing before you. There is, however, one point on which I am afraid I may have been a little misunderstood, although I tried to guard myself against misunderstanding. I by no means say that the power of infantry is any less than it has been. Nor do I wish, as I think I remarked, that one single infantry man should be taken away. I merely claim for guns that their power has been developed of late years, and that they can do certain things which they could not formerly do. But I should be the last man in the world to attempt to decry that splendid infantry which has over and over again in the fields where England has been victorious carried off most gloriously the honours of the day. I deprecate any attack on the value of infantry, or attempt to depreciate it in any way whatever.

With regard to the practical questions which have been asked, I would reply to Major Crealock that the formations of infantry at Okehampton were in every case taken as exactly as possible from the model which has been laid down for the future of the British Army, and is now carried out generally at Aldershot. The front of the half-battalion can, therefore, be easily discovered by referring to the book; but he must not forget that special occasion when the infantry was formed with front rank kneeling and behind cover, and rear rank lying down. Major Crealock also remarks that his horse, as a staff officer, and those of artillery officers, are very likely to suffer considerably. Certainly the horses do get killed, but the guns do not, and

therefore a great part of my argument went to show how there must be a front line consisting of guns, with just so many men as are necessary to work them, and as few horses as possible, with a reserve behind of men and horses, kept under cover, but always ready to supply losses in the battery, and to carry off the guns, if necessary. As for cover, it was one of the arguments of my Lecture that artillery have generally greater choice of covered positions than any other arm. Lord Waveney's suggestion of employing the cavalry like Cossacks seems to be an excellent one. I do not insist on the particular nature of the troops which should be employed, whether they should be cavalry or mounted infantry, or artillerymen, who can work both as cavalry, mounted infantry, and gunners, though I should prefer the latter. But they must be able to accompany the batteries at any pace, and to keep down the fire of such infantry as may be lying in the furrows and depressions of the ground, annoying the artillery, and even sometimes obliging it to retire when no frontal attack of infantry in formation could do so.

Lord Waveney also spoke of the weakness of the flanks of artillery. Undoubtedly they are weak, but I have yet to learn that the flanks of any arm are strong. Flanks always must be weak, and whether we have a line of guns or a line of infantry, both flanks must in some way or other be protected, or at least guarded, from unexpected attack, by having troops pushed out to give warning of the approach of the enemy. I do not think there is any very great difference between the flanks of an artillery line and those of any other line. With regard to massing guns, I think that a mistake is occasionally made in asking Officers whether they advocate the massing of guns, or the separation of guns and concentration of their fire. It comes to this, that you cannot help massing the guns; if you only push your batteries forward, they will naturally find for themselves places on the surface of the country where they can act best, and they will therefore come together by a sort of natural law.

The CHAIRMAN: The subject which has been so ably dealt with this afternoon in such a very interesting and careful manner by Colonel Brackenbury is one that I am sure you will all agree with me in thinking of the deepest interest to students of military history, and treats of a most important subject for the consideration of every soldier and Officer who aspires to any command in war. Until recently it has been customary in our service to leave the discussion and consideration of artillery subjects almost exclusively to artillery Officers; the great bulk of our Officers contenting themselves with the study of the drill, organization, and tactical requirements of their own branch of the service. In fact, until the recent great wars drew attention generally to this subject, we were contented, as an army and as a people, to consider that the question of artillery tactics had been effectively disposed of by the regulations in our drill-books, which laid down that batteries were to conform in action to the movements of the infantry or cavalry to which they were attached. You will find in the accounts of some of the most remarkable battles fought by the greatest commander in the world some extraordinary examples of a great concentration of guns. But, curious to say, from these examples we, as an army, learned but very little, although they may have been of use to a few military students, who may have deduced from them very useful conclusions for their own future guidance; but as an army we were contented with the rule in the drill-books to which I have referred. When an army was to be organised for active service in any part of the world, our Generals seemed to content themselves with attaching to each brigade and each division of the army a certain number of field batteries, which when used were brought into action, according to our regulations, with the muzzles of their guns beautifully dressed in a line upon the adjoining infantry or cavalry. This had no doubt a very striking and theatrical effect in sham fights, and was looked upon by a great number of old sergeant-majors with the greatest possible delight, but it was an ignorant use of artillery; in fact, it was not only a ridiculous and ludicrous display, but it was positively injurious to the interests of the Army, because it conveyed to the minds of young soldiers and Officers, who would look at these sham fights as a means of learning what real war was, the idea that if they went into action in command of artillery, the proper disposition of it was to have the batteries in line with the neighbouring cavalry and infantry. I am glad to say that this has now been changed. Very early in our manœuvres, when H.R.H. the Commander-in-Chief directed the general operations, he saw how inapplicable such an arrangement was to real war, and I am glad to say

he emancipated the artillery from that ludicrous obligation to which they had been tied down in former days. But although we all feel that it is as necessary as ever it has been in past times that all three arms of the service should combine together in action, it is still necessary to give to both the cavalry commander and the infantry commander a great deal of latitude of movement, if you wish to obtain from both these arms of the service all that they are capable of affording you. There is one point to which I would especially direct your attention, and that is a point I originally intended to ask you to think of when I rose, and it is a point of far greater importance. It is this : that before any Officer can really be fit to command troops in action, it is absolutely necessary that he should have thought out for himself this artillery question as thoroughly as any artillery Officer can have done so. Until he has done so, I believe it will be impossible for him efficiently, or with due regard to the interests of the country, to command Her Majesty's troops in action. As I have already said, we are, as an army, too much inclined to devote our attention to the special branch of the service in which we have been brought up. The education and training given to artillery Officers is eminently calculated to direct their attention to the solution of this problem ; but there cannot be any greater error than to imagine that special training is necessary in order to solve it. I feel convinced that, as regards the tactical use and movements of artillery in action, there is no mystery whatever, and that " he who runs may read." Any man who will bring a mind of ordinary ability to study the subject can master it, by carefully studying the history of recent wars, and by bringing his mind to bear upon the subject. He will find it to be one as easy of solution as any of the other problems in war. I think the information which has been given us upon this subject by Colonel Brackenbury is very important. Thanks to the rules of this Institution, the lectures delivered here are published, so as to be read in every garrison where British troops are quartered all over the world. I therefore feel justified, not only on the part of those I see here, but of all military students in remote parts of Her Majesty's dominions, in conveying to Colonel Brackenbury our very best and sincere thanks for the interesting and delightful Lecture he has given us.

Evening Meeting.

Monday, April 3rd, 1876.

ADMIRAL SIR HENRY J. CODRINGTON, K.C.B., in the Chair.

NAMES of MEMBERS who joined the Institution between the 21st March and 3rd April, 1876.

LIFE.

Balfour, R. F., Captain Gren. Guards.

Dalrymple, J. H. N. G. H., Viscount, Lieut. Royal Horse Guards.

Elliot, Charles, C.B., Colonel late Madras Staff Corps.

Bacon, Sir H. B., Bart., Lieut. Gren. Guards.

ANNUAL.

Holmes, J. R., Captain 8th Orkney Art. Volunteers.

Alington, Arthur H., Commander R.N.

Home-Drummond-Moray, W. A., Lieut.

Scots Fus. Guards.

Coke, T. W., Viscount, Captain Scots

Fus. Guards.

Freeth, Sampson, Major-General R.E.

Bagot, Joceline F., Lieut. Gren. Guards.

Mansfield, Hon. W., Lt. Colds. Guards.

Thornton, Harry G., Lt.-Col. Gren. Gds.

Fitzroy, G. R., Lt.-Col. Colds. Guards.

Fortescue, Cyril D., Capt. Colds. Gds.

Bell, Mark S., *U.C.*, Captain R.E.

Compton, A. F., Lieut. Gren. Guards.

ON MAGNETO-ELECTRIC LIGHT.

By Captain W. de W. ABNEY, R.E., F.R.S., School of Military Engineering, Chatham.

I MUST apologise for having undertaken to introduce the subject of the Magneto-Electric Light, as I do not believe myself entitled to speak with more authority on the subject than those Officers who have closely studied the means of utilizing it for military or naval purposes. My acquaintance with it has been chiefly in what I may term its scientific aspect; and I have, therefore, proposed in a great measure to devote this evening to those points in regard to it, which may be less generally known. The aspect in which it will be considered is capable of creating great interest if rightly demonstrated; but I fear that with my limited practice of public lecturing I shall fail to succeed in doing justice to it. The excuse I must plead for being here to-night at all is, that I was asked by the Council of this Institution to read a paper on the subject, and I consented to do so, though with much hesitancy, as they can testify.

The ordinary sources of illumination such as oil lamps, or the oxy-hydrogen light, from their small amount of power are manifestly quite inapplicable for naval, or military purposes, when it is desired to illuminate land or water from any but close proximity. To light an enemy's lines, to discover his working parties, or to sweep an area of sea in order to search for hostile boats which might be sent at night to grope for torpedoes, requires a much more powerful light than either of the two foregoing, even when concentrated by a lantern. The light emitted by incandescent particles of carbon previous to their oxidation are utilized in the ordinary candle flame, but when the heat is increased to an extent verging on the absolute vaporisation of these particles, the light must of necessity be much more intense. This intense heat can be attained by passing the electric current be-

tween two carbon points, the electricity being generated in one of two ways, 1st by a voltaic battery composed of Groves's or Bunsen's cells; or 2ndly, by magneto-electric induction, when the electrical intensity can be enormously increased. The first mode of creating the necessary current is by the rapid consumption of zinc by an acid. We know from every day experience that when coal is burnt, the carbon of it is oxidised, and the act of the combination of the carbon with the oxygen causes the generation of heat waves. Similarly, when zinc is consumed at a rapid rate by an acid in the presence of a less readily oxidizable metal, electricity is generated, causing a disturbance in the medium permeating the conducting wires; and when the disturbance meets with opposition, the electricity is converted into heat, and this again when sufficiently intense, into light.

In order to understand the action of the electric light, it must be borne in mind that heat, light, electricity, and magnetism are each of them the effects of vibrations executed in the ethereal medium which pervades all space; that they are of the same character and nature, being only distinguishable one from the other by our senses, and that they are convertible one into another. In the case before us at present, the light is caused by the conversion of electricity into heat, and thence from heat into the sensation we call light. To obtain sufficient intensity and quantity of electricity, 40 or 50 Bunsen's cells are coupled up together; and the current is allowed to find its way along the conducting wires to two graphite rods of small section, held in position in the lamp before you. The rods are now separated by about half an inch, and the quiescent state of the battery tells us that there is no fresh generation of electricity. The ends of the rods are now, however, brought together, and, as can be seen on the screen, at the point of contact they begin to glow with a red heat. The battery is evidently at work, and the heat is due to the resistance the current meets where the contact is made. The graphite rods can now be separated gently till they are more than half an inch apart, but the conditions are changed. The air between their points is now intensely heated and rarefied, and is consequently a better conductor. The current still passes, carrying with it, from one of the points to the other, carbon in a partially volatilized state. The heat is so intense that a brilliant light is produced, equal to at least 1,000 candles. A Groves's cell consists of a plate of platinum immersed in nitric acid contained in a porous cell, and a zinc plate surrounding this porous cell, both being immersed in dilute sulphuric acid. The last acid has a strong affinity for zinc, and dissolves it with the liberation of hydrogen, which is collected on the platinum plate when the zinc is connected with it by any conducting substance externally to the battery, and decomposes the nitric acid in the porous cell into nitrous acid and water. This action was shown by the nitrous fumes evolved. I now wish to demonstrate the heating of platinum *wire* by the voltaic current, as it is analogous to that which will be shown with a small magneto-electric machine. Two yards of the wire are taken and the current passed through it with no visible effect. The length is gradually diminished, and the wire becomes red-hot, then white-hot, and it finally fuzes. Could an equally fine

section of graphite be obtained, the fusion would not have taken place. The practical impossibility of fusing graphite has led to its adoption in the production of the electric light. I may here mention that a lamp has been constructed holding very fine rods of carbon, through which a current is passed in a manner similar to that which has just been demonstrated.

There is a certain amount of manual labour necessary to put the battery together, and unless renewed, the light is only good for about three hours at a time, which is almost too short for actual work in war-time, though sufficiently long for carrying out experiments. Fifty Groves's cells require half a gallon of nitric acid, and about a quarter of a gallon of sulphuric acid; and after the zinc plates are amalgamated, to ensure a constant current, it takes about three-quarters of an hour to fill them. The light should be used immediately after the battery is made up, or a useless waste of zinc ensues, and a consequent deterioration of the light.

The second mode of production of the electric light is by the action of magnetism. If a magnet be slowly introduced into a helix of iron wire which is connected by wires with a galvanometer (an instrument which tells when electricity is passing in any circuit), the needle of the instrument will be found to be at rest. When, however, the magnet is quickly withdrawn, there will be a slight deflection of the needle for an instant, showing that a current of electricity is passing. On again suddenly inserting the magnet into the helix it will be observed that the needle slightly moves in a contrary direction, showing that an electrical current is passing in the opposite direction. It is the fact that small momentary currents are thus induced in a helix, on which the generation of the magneto-electric light is based. With a properly constructed helix and with a very rapidly withdrawn magnet, currents of a most intense character can be created.

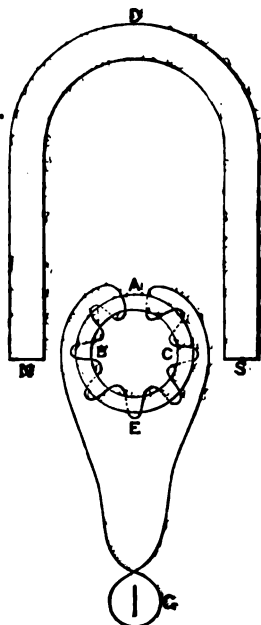
Another experiment which I wish to show is the magnetism that is induced in soft iron when a current is passed through a helix surrounding it. This rod of soft iron has no attraction for these iron nails, but when inserted in this helix, through which a current of electricity circulates, it shows magnetism by picking a bunch of them from the table. In the magneto-electric machine a portion of the current is utilized to produce this electro-magnetism, and the strength of the light-giving current depends much upon it.

Perhaps the construction of a Gramme machine may now be understood.

Let NDS, Fig. 1, be a horse-shoe magnet with its north and south poles at N and S respectively, and let ABC be a soft iron ring with a helix of insulated wire wrapped round it, and the ends in connection with a galvanometer, G. Wherever N and S are opposite the iron ring, there it will become magnetized by inductive action. Thus, in the position shown, B will be a south pole and C a north pole, whilst A and E will be points of no magnetism. Suppose the magnet to rotate round the ring, ABEC, in the plane of the paper as it moves the magnetism in the ring will shift, and the same action takes place as in the foregoing experiment: the magnet will be perpetually moving inside the

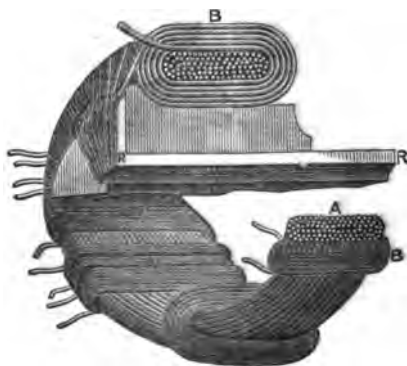
helix, consequently a current will be excited which will be shown by the deflection of the needle in one direction or the other in the galvano-

Fig. 1.



meter, G, excepting only where either N or S is opposite A. Manifestly the same result would ensue were the ring rotated instead of the

Fig. 2.



magnet, and this procedure is adopted in the Gramme machine. Instead of the wires being connected with the galvanometer, as shown

in the diagram, the helices are laid bare at parts, and copper brushes, placed at the neutral points A and E, take away the electricity as they come opposite those points. By employing a brush at each point instead of only one at A, both the negative and positive currents are utilized, and being led to the galvanometer (or through the lamp) in different directions, a greater intensity is obtained. The artifice of using the brush collectors causes the current to be continuous, though it rises and falls in intensity within certain limits.

The construction of the ring armature is shown in Fig. 2.¹ We have at A, a section of the iron ring itself formed of a bundle of soft iron wires. At B B are the helices, one in section and one detached. At R R the form is shown of one of the copper conductors to which the ends of the helices are attached and from which the current is drawn off by means of copper brushes at A and E' (Fig. 1.) I may here state that if the brushes were placed in any other position than A and E, the current would be largely diminished, and if at B and C there would be no current at all, for then the current travelling one way would meet the other travelling the other and they would neutralize each other. By means of the great depth and closeness of the spirals a very intense current is set up when the armature revolves.

Fig. 3.

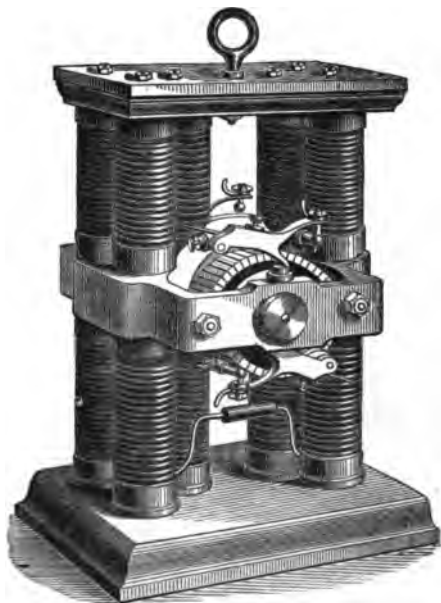


Fig. 3 gives the complete Gramme machine:—The circular ring armature is shown and it will be noticed that the magnets take the form

¹ Figs. 2 and 3 have been taken from Breguet's pamphlet on the Gramme Machine.

of electro-magnets, thus increasing the power in a wonderful degree. The armature and these act and react on one another by induction and produce a current so powerful that it is sufficient to produce the most *intense* light when passed between carbon points. The motive power is generally steam, and from theoretical considerations, it seems hopeless to expect to produce a useful light by the direct application of human muscle. The fuel necessarily consumed in causing the armatures of any machines to rotate, with sufficient rapidity, for its production, is much greater than is to be found in man, even were his muscular power equal to it. Perhaps the day may come when we can accumulate the energy or work of man, as we do when we wind up a watch, but even then the labour of one man for a week will be expended in a couple of hours. On economic grounds, therefore, steam or water power must be resorted to.

It would, at first sight, seem that by indefinitely increasing the number of revolutions, that is, by indefinitely increasing the amount of coal burnt in the furnace of the engine driving the machine, we might attain an infinitely intense light. Here, however, we are brought face to face with two facts which must cause a limitation; firstly, the intensity of the light must be dependent on the amount of magnetism of which the coils are capable of holding; and secondly, it is limited by a physical principle which has hitherto, perhaps, not been sufficiently recognised, viz., that a great portion of the increased power given by increased consumption of fuel, goes to perform a different kind of work. It must be remembered that white light, as it is called, is merely a name expressing the combination of many coloured rays, some visible and a still greater proportion invisible, each of which is caused by its own distinctive tremor in the ethereal medium, and the waves of which have a fixed distance from crest to crest, lengths so small as to be measured only by the most delicate methods.

Taking the example of a magneto-electric machine that we have here, if the armature is caused to rotate at a comparatively low speed, the graphite, or metallic wire (which latter we have here) will remain black, though to the hand there will be a perception of heat. By causing the armature to rotate more rapidly, we get a red heat, and by exercising still greater power we get a white heat or white light, which at last is so intense that we fuse the platinum wire. Now, if force were still further brought to bear, and we had used a graphite rod of small section, the light emitted would have a decided violet tinge. From this point a very large proportion of the extra work the engine might be called upon to perform would go to produce the shortest waves of light which are imperceptible to the eye, excepting by an artifice; hence the extra expenditure of fuel is to a certain extent unproductive for the purpose required. In other words, more fuel is required to produce the ultra-violet rays than to produce the violet, and the violet than the blue, and the blue than the green, and so on. It must also be recollected that the coils of wire round the machine are really part of the lamp, and that work is expended in heating them by magnetisa-

tion and demagnetisation in the same way as it was expended in heating the platinum wire. In one case, of which I am cognisant, a magneto-electric machine was worked at such an immense speed, that on dismantling it the wires were found carbonized, and consequently it was spoilt, though the light produced was no better than when a less speed was adopted. It may then be taken as a fact that the brilliancy of light a machine is capable of producing, is dependant on the weight of judiciously-placed iron. From some recent experiments which I was called upon to undertake, abundant proof was furnished that the violet and ultra-violet rays of the spectrum were largely increased compared to the other rays, when a machine was driven at a high speed. It is doubtless well known to all, that chloride of silver is sensitive to certain coloured rays (shown by a darkening action), but that by the rays extending from the green to the red it remains unchanged. If then the optical and also the photographic values of the light be measured and it be found that with increased speed the photographic value increases at a higher rate than the optical, we should be certain that the higher rays had increased proportionably more than the lower ones. The instrument, which I have called a diaphanometer, employed in these experiments for finding the optical value of the light is that shown. The light to be measured is reduced to the same intensity as a standard wax candle, burning 130 grains per hour, by means of a black wedge. The amount of light cut off at each part of the wedge is calculated, and from a formula, the intensity of the illuminating power of the electric light is known. The photographic value of the light was obtained by placing strips of uniformly sensitive paper, at a

Fig. 4.

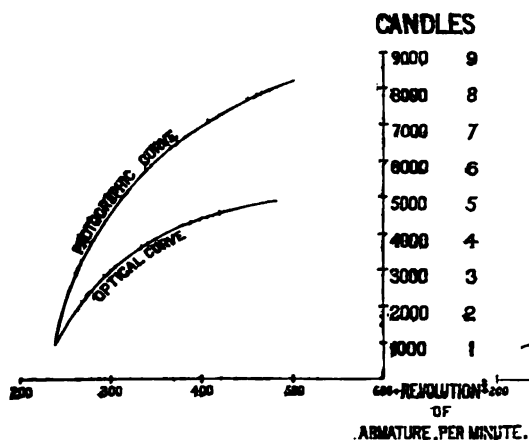


Fig. 5.

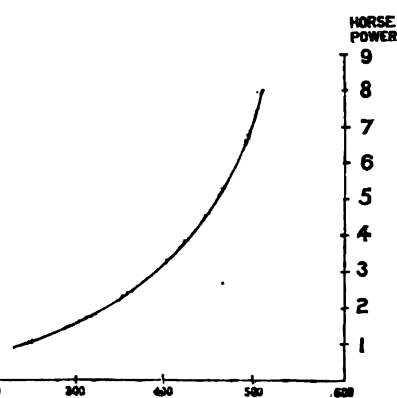


Fig. 4 shows the relative values obtained by photography and that by the eye. Fig. 5 shows the horse-power consumed in causing the different number of revolutions of the armature per minute.

constant distance from the points, beneath a thin graduated wedge (together with others unshaded), and allowing them to be acted upon by the light for a fixed period. A comparison with a tint produced by sun-light as a standard, enabled a comparative photographic value of the light to be formed for each number of revolutions of the armature. The curves shown, give the photographic and the optical values of a machine driven at varying speeds. As before announced, the conclusion to be deduced from these curves is, that for each machine there is a certain limit to the useful work that can be drawn from an engine. With an average machine, it seems that when working to this limit, one-horse power is equivalent to about 800 candles, an equation which can be turned into the amount of coal necessary to be consumed per hour for the production of a certain intensity of light.

Here we have an example of a comparatively large quantity of low heat produced beneath the boiler of the engine converted into a small quantity of intense heat (sufficient to melt platinum, the most infusible of metals), with the accompaniment of an intense light. In both cases, the heat taken up by a theoretically perfect engine, and the amount it gives out, are equal, though the quality and intensity of the heats vary.

A stationary magneto-electric machine, which seems suitable for military purposes, weighs about 17 cwt., and requires an engine of about 6-horse power to drive it. No doubt the apparatus for generating light by voltaic electricity is the more portable, but it gives less brilliancy and is more easily put out of order: 12 hours' work can easily be got out of the former, whilst it is doubtful if even a fair light would be kept up continuously for three hours with the latter.

We now come to the value of the light for illuminating purposes. It has been calculated that each mile of dry air abstracts by dispersion (caused by the reflection of particles held in suspension) about 5 per cent. of the brightness of the light.

In general, the formula expressing this absorption is,

$$B_1 = B_0 E^{-mx}.$$

When B_1 is the brightness to be found, B_0 the initial brightness, m the co-efficient of absorption, and x the distance through which the light travels.

Thus at the end of one mile, with 5 per cent. absorption,

$$B_1 = \cdot 95 B_0,$$

at the end of two miles,

$$B_1 = (\cdot 95)^2 B_0,$$

and so on.

The brightness, however, is only a factor of the illuminating power, though for signalling purposes it is the principal effective.

Suppose we call this last I . Then I , diminishes as the square of the distance, because the same light has to illuminate a larger area.

The formula is,

$$I = \frac{B_0 E^{-mx}}{x^2}.$$

From the foregoing figures it may be believed that the brightness diminishes very slowly, and that for military or for naval purposes, the diminution need not be taken into account. This is, however, not the case, for when the atmosphere is hazy a very much larger percentage than 5 is cut off, and as a rule, amongst the parts chiefly absorbed are the most luminous rays, viz., the yellow and green. In moderately foggy weather the brightness of the light at half a mile is often reduced 90 per cent., whilst at a mile it would then only have $\frac{1}{10}$ th of its original value, and the light absolutely reaching the spot would be of a decidedly red tint; an ordinary example of the absorption of the rays of white light is the light of the sun's disc seen through a London fog. Aqueous vapour absorbs nearly all the ultra violet rays, diminishes the blue rays, but leaves certain of the red rays nearly intact; from this we may deduce that a red light can be seen farther in misty weather than a yellow, green, or blue light. If possible, then, it should be arranged that the light should be of as red a character as possible, not by the interposition of red glasses, or other red media, for they only accomplish what a fog itself would do, viz., cut off the most luminous rays; but the absolute light itself should be reddish, that is its component rays should have as long wave-lengths as possible. Now there are two ways of accomplishing this; 1st, instead of having one lamp giving a very intense light composed of rays of a proportionably high number of short wave-lengths, we may use the same power and produce two or more lights, which taken together, are richer in the longer wave-lengths than in the smaller. A glance at Fig. 4 will show that this is possible. 2ndly, instead of pure carbon points, we may use a combination of carbon with metals which, when volatilized, shall produce a red light. Amongst these metals are calcium, strontium, and lithium. They are very expensive as metals, but in combination with non-metals, such as chlorine, they are cheaply procurable in commerce. Some experiments undertaken at Chatham have been of such an encouraging nature that I hope this method of attaining the desired end may be practicable.

On the screen is now thrown the light produced by incandescent carbon and volatilized calcium. The tint is of a red colour, and when a ray is passed through a prism and allowed again to fall on the screen, the spectrum is at once seen to be richer in red rays than in the more refrangible. A similar effect is produced when we employ strontium or lithium with the carbons.

The illuminating power of the most powerful magneto-electric machine that I have seen is equal to about 11,000 candles. Sunlight itself is equal to about 5,000 candles, concentrated at a distance of 3 feet from the object. At the sun's distance, to give the same light as he does, would require 130×10^4 candles, supposing no atmosphere intervened between us and him.

On the supposition that no brightness of the light were lost through impurities existing in the air, at a distance of half a mile a machine giving a light equal to 5,000 candles, could have an illuminating power equal to $\frac{1}{125}$ th of a candle held a yard off an object. If,

however, only half the sphere of the light could be condensed into a beam having angular dimensions of $15^\circ \times 5^\circ$, the light would be intensified 100 times, or would be about equal to a candle shining on an object at a distance of four feet, a light evidently quite strong enough to be of use. At a mile, the light would be equal to one candle at 16 feet distance, which would be still fairly efficient, particularly when an observer collects greater intensity by using field glasses.

Perhaps I ought to explain why it is suggested to condense the beam into $15^\circ \times 5^\circ$; 5° is quite sufficient *depth* of beam to illuminate any depth of area from a moderate height—that is, in a direction *away* from the light, whilst it seems insufficient to illuminate a proper width of area. Some lanterns are constructed to throw a beam of only $2\frac{1}{2}^\circ$ in width. There is more concentration of light, but the smallness of the angle subtended at the eye by the illuminated portion prevents a certain requisite distinctness. Also in sweeping an area to discover an attacking force or boats, the chances are that with a 15° light they will be more readily picked up than with a $2\frac{1}{2}^\circ$ light, as the time which it would rest on any one spot, would be nearly six times with the former as compared with the latter.

A larger angle than 15° is not advisable, as then the effective light rapidly diminishes in intensity. I may also remark that the beam of light is always more intense at the centre than at the margins, which seems advantageous in some respects.

I have already referred to red light as being the most penetrative in hazy weather. It has also another advantage, which strikes me of importance. *Form* can be more readily distinguished by a red or a blue light than by white. This is not an observation which is a merely personal one; on one occasion a large number of gentlemen attended an exhibition of the powers of a machine, and all noticed the same fact. It admits, I think, of explanation in this way: supposing an object illuminated with 64 units of white light, and another next to it with only 1 unit; this latter will not find a place on the retina, but will appear dark. Now, with the electric light those objects which happen to be in the direct path of the beam only receive illumination by reflection from adjacent objects; or if at a very obtuse angle with the beam, receive only a very limited portion of light. It can rarely happen that the reflected light is equal to $\frac{1}{4}$ th of the direct light; therefore, these reflecting objects remain unseen. With red light, experiment has convinced me, that a much larger difference in intensities can be appreciated; hence with it the form of an object can be more readily grasped.

Whether the similar effect produced by blue rays can be explained in the same manner I do not know, as no experiments have been undertaken to ascertain it.

The fact remains, and whether the explanation be satisfactory or not, it may be worthy of consideration when the light is employed for naval or military purposes. A piece of blue or red glass placed in the path of the rays will be effectual, if it does not cut off too much light.

It may be useful to point out the conditions under which an illumi-

nated area of land or sea can be most favourably watched. It is a matter of remark that most people naturally choose a position close to the source of light, imagining that somehow they thereby observe with an increased intensity of beam. This is a serious error, and one to be avoided. An observer (excepting in an unusual state of the atmosphere), should always stand away from the source of light. The most favourable position is naturally as close to the area as possible, but also nearly at an angle of 60° with the axis of the beam. An elevation of position is also a desideratum, for then full advantage of its depth as well as its breadth is obtained. The reason why a position at an angle with the axis of the beam is desirable is this, that where light is emitted from a point, the whole of the small particles of dust and vapour existing in the air (and which lie in its path) are strongly illuminated and reflect back light to the eye. The mistier the weather, the stronger the reflection will be. Throwing the beam of the electric light in the air of this room, its track is very perceptible to all. When we allow a little smoke to ascend through the rays the reflection becomes much strengthened. The particles of a mist, or of steam will evidently reflect much of the light, and there will be a consequent absorption and diminution of intensity after passing through an atmosphere charged with either. When standing near the lamp, the eye has to receive the illuminations of all those particles between it and the object, and if the latter be half a mile off, it can well be conceived that the effect is dazzling. Besides which, the eye cannot distinguish an intensity differing less than $\frac{1}{4}$ th part. It might, therefore, happen that the light from the object and the particles would come within that limit.

When, however, the observer occupies the position indicated, it will be found that by taking the value of the light thrown back from the object and that from the reflecting particles, he obtains the maximum of distinctness of view. Though having a general knowledge of the effect of particles in the air when in the path of a beam, my attention was not particularly called to the subject till lately, when I attended some trials of different lights at Portsmouth. Boats were sent out whose supposed mission it was to grope for torpedo cables, and to cut them, in order to render submarine mines ineffective. On shore and in guard-boats observers were stationed to discover their approach. It was nearly invariably the case, I believe, that parties who occupied positions well out of the path of the light were the first to distinguish them, and generally it was some considerable time after, before those who were near the lamp could discern them.

As regards the attack on torpedo positions from the sea, it would be almost impossible to employ steam launches, as the white steam is always lighted up at very long distances, leading to the discovery of their whereabouts at once. Vessels may be constructed in which any escape of steam or smoke may be prevented, but at present such are rare. As a rule, I take it that ordinary boats, propelled by oars, will be employed.

From a position near the light, a black boat would naturally escape detection, but the faces of the rowers and the splash of the oars would

water thrown up by the oars would be very readily distinguished. Probably a crew with blackened faces and hands, using muffled black oars, might hope to approach unobserved from such a position, but from a point nearly at right angles to the beam, the illumination of the water would cause even a black object to stand out, particularly as a dark shadow must be cast by it. There are, doubtless, some present here to-night who can speak more authoritatively on this point than I can.

Another question arises *which is this*: supposing a boat to be observed, could guns be brought to bear upon it with any chance of success? It seems probable that they could. With a proper adjustment in the centre of the lens, there could be placed a small diaphragm, cutting off a small central portion of the beam. When this was caused to fall on the boat, its horizontal angular position with some fixed point and its angle of depression could be given by graduated arcs, and the sighting necessary to give the guns could be ascertained from a previously constructed table. The lamp itself under these circumstances would become a range-finder when its height above the level of the water is known. Whether this would answer better than ordinary methods is open to doubt; but I believe it would, as the object seen through an ordinary telescope would be not so easily found as when it can be found by the lamp itself.

As to the safety of the light when used to illuminate the sea, there is not much to be dreaded from enemy's guns. It would require an uncommonly good judge of brightness to distinguish the difference between the electric arc half a mile or a mile off, even when the normal value is known. As the intensity is variable, the chance of judging the distance is very small. If an enemy should be aware of the exact spot on which the light would be erected, he might have data on which to fix his measurements, but if the light could be moved only 200 or 300 yards, the chance of his directly striking the apparatus may be dismissed. The possibility of irreparable damage from shells might be avoided by the use of a couple of plane mirrors, with which to reflect the light from a safe position.

As to the shape the lamp should take, there are, I believe, diversities of opinion; but certainly, on theoretical grounds, the catadioptric form ought to be better than either the dioptric or catoptric.

In the dioptric system, when no reflectors are employed, a large quantity of side and back light is lost.

In the catoptric system, where reflectors are used, it has been calculated that two-thirds or three-fourths of the light is wasted, being dispersed in directions not required, unless a complicated system of auxiliary mirrors be adopted. Again, metal, of which most parabolic reflectors are made, also causes a great loss of light, due to the hammering which it undergoes.

In the catadioptric system, both reflection and refraction are utilized; and when the reflectors are formed of glass, the waste of light is minimised. Fig. VI represents a lantern which has been actually employed in military experiments. The catadioptric system is also now feasible; as by the method, introduced, I believe, by Chance

Brothers, of Birmingham, glass rings of accurate section, both for lens and reflector, can be made of the most effective nature. It will be noticed, that the principle of total reflection would be adopted in the reflector; and unless the angle of reflection be much greater than a

Fig. 6.

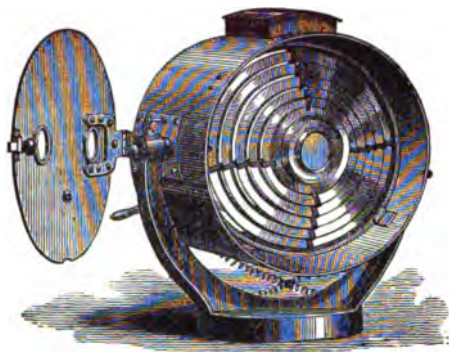


Fig. 7.

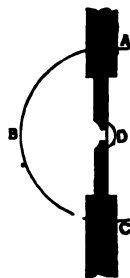


Fig. 6 shows the section of the spherical reflector, the centre of the electric arc being the centre of the sphere.

Fig. 7 shows the lens of the lantern in perspective.

right angle, there will be no appreciable loss by prismatic dispersion. In every case, whatever may be the form adopted, the lamp should be capable of revolving round a vertical axis, and also of depressing or elevating the beam.

To test a lamp, the eye should be placed where the electric arc will be produced, and every point of the area should be distinct through the lens, showing that the rays converge properly from the position on which the light will be cast. The lamp, in fact, becomes a camera-obscura, with one huge objective. This mode of testing was first suggested by the Astronomer Royal, whose theoretical researches on light have gone far towards causing the present improvements in all kinds of optical instruments.

We, of the Services, are morally bound to employ any agency which will be effective in prolonging a defence or in shortening an attack; and it seems to me, that in the magneto-electric light we have a weapon placed in our hands which we shall eventually be compelled to adopt. The time when night attacks are to be dreaded as much as they are to be now, must pass away with the introduction of a means of illuminating an area round a fortress or an entrenchment. The value of a gun must be much enhanced when it can be rendered nearly always effective; and I look upon it, that the time is not far distant when an armament will not be complete unless it has a means of being employed with advantage at night. I do not believe that we have at present the very best form of light, any more than I believe that we have a perfect gun; but it strikes me that the former is so far advanced

in effectiveness that it should be rendered a necessary adjunct to any fortress and force.

In our telegraph train, the army has naturalized one form of electricity, and before many years have passed, I believe, it *must* adopt that form which I have endeavoured to demonstrate to you to-night.

The day has passed when the Services can afford to put inventions under their pillows, and sleep upon them ; they must be always awake to the progress that science makes, and be ready to adopt and adapt any discovery which will help them onwards towards perfection.

The CHAIRMAN : I must say that we are all very much indebted to you for the information you have given us on this subject. Of course, we understand that there are points which you cannot go into, namely, such matters as have been under your consideration on behalf of the Government ; but I am happy that you have been able to give us so much information which does not in any way trench upon your position with the Government, and we are very much gratified by it, and thank you sincerely for it.

SPECIAL LECTURE.

Monday, February 14, 1876.

GENERAL LORD SANDHURST, G.C.B., in the Chair.

"THE TURKISH FORCES," AND "THE MILITARY "ASPECTS OF THE EASTERN QUESTION."

By C. E. HOWARD VINCENT, Esq., F.R.G.S., Lieutenant-Colonel Central London Rifle Rangers, and of the Inner Temple, Barrister-at-Law (late 23rd Royal Welsh Fusiliers).

You have come here, Gentlemen, this afternoon to hear a lecture on a most interesting and important matter. It would be scarcely too much to designate it as the most prominent subject of the hour. For twenty years it has slept upon the blood and treasure expended in its solution, but to-day it is here presenting greater difficulty, greater confusion, a more dismal future than ever. After what has fallen from the Chairman I make no apology for having responded to the wish that I should summarise for the members of this Institution my recent studies in the Ottoman dominions and the neighbouring countries. I would, however, crave again that indulgence which thrice before in this theatre you have been pleased to extend to me. I would seek it by reason of my own infirmity, by reason of the special difficulty of the task that lies before me. This, as you know, is no political arena, but rather a forum, to advance the knowledge of those sciences which pertain to the united services. Therefore have I to perform the somewhat delicate operation of dividing one portion of my researches from the other, of severing the military crust from the political substratum. I shall strive to keep wholly within the wise rules laid down by the Council; yet, lest I should even by insinuation overstep the line, I would observe that I alone am responsible for every word that I utter.

Gentlemen, I propose, as you will perceive, to divide my matter into two sections.

I. The Turkish Forces.

II. The Military Aspects of the Eastern Question.

I trust I shall not so weary you with the first as to lose your earnest attention for the second. But it appears to me that a mature exami-

nation of the Turkish forces must needs precede any accurate conception of the "The Military Aspects of the Eastern Question."

Without further prelude, then, I will pass in review before you the Army and the Navy of His Imperial Majesty the Emperor of the Ottomans. In doing so it behoves me before all to say, that whatever be the errors into which a defective education has led a strong and capable mind, however great the difficulties besetting eastern sovereign life, however fabulous, however true the personal narratives that penetrate the veil of its mystery, one thing is certain, that Abdul Aziz II, Sultan of Turkey, is an advanced and intelligent military reformer.

Into 120 military conscriptions are the Ottoman dominions divided, and nearly evenly among them are located the seven corps of which the Imperial Army is composed. Following exactly the northern model four units make up the total of national defence, viz: :—

- (1.) The Standing Army, or Nizam.
- (2.) The Reserve, or Ekdia.
- (3.) The Militia, Landwehr, or Redif.
- (4.) The National Guard, Landsturm, or Mustafiz,---

representing, without the aid of the latter force, a paper strength of 750,000 men. Make no note, however, of these figures, nor of any indeed taken from Turkish sources which I may adduce. I frame my data from the concurrence of testimony, but cannot even thus hope to be near the mark. There is no doubt that it would be impossible to put more than half a million of Turks into the field.

(a.) The standing Army is recruited by conscription from the Mahomedan population of the Empire. Six times does the faithful Mussulman drive into the ballot-box. If in these six years the Nizam does not secure a recruit, the lucky one passes at once into the Redif. Such, though, cannot be the good fortune of the majority, and the conscript thus spells out his 20 years of service :—

- | | |
|---|-----------------------------|
| 4 | years in the standing Army. |
| 2 | " in the Reserve. |
| 3 | " in the Redif (1st ban). |
| 3 | " in the Redif (2nd ban). |
| 8 | " in the Mustafiz. |

The four years in the standing Army are usually reduced to three, or even two—a measure reducing battalion strength, but prudent alike on social and economical grounds.

Of the seven corps d'armée that I mentioned, three are stationed in Europe, at :—

- | | |
|----------------------|--------------|
| (1.) Constantinople. | (2.) Shumla. |
| (3.) Monastir. | |

and four in Asia, at :—

- | | |
|----------------|----------------|
| (4.) Erzeroum. | (5.) Damascus. |
| (6.) Bagdad. | (7.) Sanala. |

Each corps consists of :—

- | | |
|---|--|
| 7 | regiments (28 battalions) of Infantry. |
| 5 | " (30 squadrons) of Cavalry. |
| 1 | (84 guns) of Artillery. |

with a theoretical strength of 27,000 men, which in war is supposed to be supplemented by 34 battalions of Redifs.

The first corps is frequently termed The Imperial Guard, and Yousouff Effendi, the eldest son of His Majesty, is the titular Commander. The men composing it are in a great measure selected from the whole Empire, for the inhabitants of the capital are exempted from service.

The Turkish infantry may be said to be without its superior in Europe as regards material. It consists of 49 regiments with four battalions of eight companies. The system of drill was devised by Hussein Avni Pasha, now Governor of Broussa, but under whose Grand Vizierate and Presidency at the Seraskeriat, the flood-gates of improvement opened on the country and the army. The rapidity with which the Osmanli soldiery move is extraordinary and unparalleled—compact independence, to which the neat yet easy uniform conduces. A fez, blue jacket and waistcoat trimmed with red, scarlet sash around the waist, trousers ample to the middle of the calf, then tight as a gaiter, and running into a soft boot of untanned leather. Such is the dress of gunner, trooper, and linesman.

The infantry is completely armed with breech-loading rifles—long Sniders, short Sniders, original, converted, of Tower pattern, of American make, Winchester's, Remington's, Peabody's—every system, I believe, that inventive genius has devised. Rifles, though, are not of themselves engines of destruction. They resent neglect and hard usage. Without cartridges they avail but little, and there is no machinery for issuing the complex ammunition required. In time the Henry-Martini rifles ordered from the Providence Tool Company will be supplied, and more uniformity insured.

The Ottoman cavalry consists of 35 regiments of six squadrons each, with a supposed complement of 100 men, armed for the most part with Winchester repeating carbine, sword, and pistol. At best, the cavalry partakes considerably of an irregular character. The men are good Oriental horsemen, but the Officers are no less untrained for field service than they are by nature unendowed with dash, energy, and spirit. The country is full of smart little horses, but there is no remounting system, and not unfrequently a fourth of the regiment is on foot, another fourth on worn-out screws ere a remount grant can be obtained. Of one regiment it is narrated that, reduced to a few score mounted men, the Colonel, after long solicitation, obtained the required sum. The season was winter. He thought that the fund placed at interest till the spring would then enable him to buy more animals. The Koran forbade such a scheme. In the regimental chest the sum was locked. There were long arrears of pay owing to the men, and an order came that the remount grant should be applied to defray them. The regiment of horse became a regiment of foot.

The Imperial artillery boasts of seven regiments and one in reserve. Each regiment is composed of three horse and nine field batteries of six guns. The former have four-pounders, the latter six. The whole of the guns are on Krupp's system and of his manufacture, with the exception of the six mountain guns made by Sir

Joseph Whitworth's firm, and the six mitrailleurs attached to each regiment. Not only has the whole of the artillery been provided with breech-loading cannon, but there are sufficient in store to re-arm every battery. As with the rifles, though, the feeding machinery has been neglected. The guns are there, but ammunition-waggons are to a great extent wanting.

The chief deficiency of the Turkish artillery lies, however, in the horses. The native animals are not adapted to the work, and the entire supply has to be drawn from Hungary. An annual commission is sent, and some good animals obtained at prices varying from £25 to £40. But it is on all sides agreed that the Hungarian horse is deficient in stamina, and in many eventualities it is obvious that even this market would be closed. The scarcity of draught horses becomes a more serious thing when the total absence of a transport corps is considered—in a country, moreover, where no levy on the inhabitants could produce any result. It is much to be hoped that some War Minister, remaining sufficiently long in office, will foresee the straits to which any serious campaign must reduce the Government, and take measures accordingly by founding breeding establishments for draught horses. Any surplus stock would meet with a ready sale.

There is likewise no regular engineer corps, as the state of the defences throughout the Empire only too clearly shows, and of course both pontoon and telegraph trains are wanting.

The Medical Department of the Army, on the other hand, is well organised. The School of Medicine at Pera is turning out excellent graduates—not enough, truly, at present for the requirements of the service, but in time the German surgeons now in the temporary employ of the Porte will be supplanted by Turkish practitioners. One alien alone will then remain, Dr. Temple, formerly of the 18th Royal Irish, attached to the 1st Regiment of Artillery, and Surgeon Extraordinary to his Majesty, exempt by Imperial mandate from the disqualifications of foreigners.

The military hospitals are numerous, well arranged, and beautifully kept. Close to the principal one at Scutari is the British cemetery, the resting-place of many a gallant soldier of the Queen. The care bestowed upon it by the guardian, Sergeant Lyne, late of the Royal Engineers, is beyond all praise. Strange is the contrast with the ruined graveyards of the Turks hard by.

The Officers of the Ottoman service now demand consideration. They form, with the exception of the surgeons, the weakest portion of the entire system. Ill trained from cradle to school, ill regulated from school to life's close, they possess, though perhaps not by their fault, few physical or moral virtues. Forced to discount their pay at ruinous rates, the majority live from hand to mouth, and military proficiency meets with but scant reward. The Staff hardly deserves the name, although some of its members receive a kind of special training, so small is it numerically; so weak, for the most part, intellectually; so indolent physically. With all this, it would be unbecoming in me not to make a grateful acknowledgment for the kindness with which, from the Minister downwards, I was treated. Without any official character

or recommendation, every consideration was shown me as an English traveller. Every Turk looks upon the Englishman as his natural ally. With Major Osman Bey, Aide-de-Camp to the Seraskier, and formerly Military Attaché at St. Petersburg, I visited every barrack, hospital, and military institution within reach of the capital; and everywhere, as previously on the Danube, I met with the same cordiality, the same friendly greeting, the same desire to show everything—to conceal nothing.

Nor must I omit to pay a just token to the Military Schools of the Empire. There are many exceedingly well regulated, and they form the peculiar pleasure of the Sultan. The shortcomings of Turkish officers are in no way traceable to any deficiency in the means of education. The schools are of two categories—primary, giving a general education, and receiving boys for four years between the ages of twelve and eighteen; secondary, receiving students under sixteen years of age, and after a four years course drafting them into the army. I visited a school of each character in detail, and many as now are the military colleges in Europe that I have visited, I never found a better system in any country.

The Auxiliary Forces are divided, as I said before, into three categories:—

- (a.) The Reserve, or *Ikdiat*.
- (b.) The Militia, or *Redif*.
- (c.) The National Guard, or *Mustafiz*.

The Reserve is formed:—

- (1.) Of those who have served four years in the standing Army.
- (2.) Of those who have been released before the full period of their active service has expired:—

They belong to it until the completion of the sixth year of their enrolment under the Crescent. Arms for the Reserve of each battalion are kept at head-quarters; clothing and accoutrements likewise. In theory the reserve men on the outbreak of war revert to their original corps. But, owing partly to the absence of all methodical civil administration, partly to the imperfect means of communication, there is no possibility of the principle being enforced. Last autumn showed the truth of this statement. The reserve men are seized by the first regiment they meet. Were it otherwise, in the words of Colonel Zelinoi, the able and indefatigable Military Attaché to the Russian Embassy, they would never reach the theatre of operations. It is obvious that such a system is in the highest degree injurious to sound organisation. One battalion takes the field 300 strong, another with more than double the number.

The Militia, or *Redif*, consists of:—

- (1.) Those who have escaped the conscription.
- (2.) Those who have completed their term of service in the *Nizam* and the Reserve:—

The period of service is twelve years—the first three, theoretically, in the senior battalion, the second three in the junior battalion. But, with very few exceptions, this second battalion has no real existence. The officers of the *Redif* form a permanent institution in the proportion of

two to each company, and one field officer per battalion. They should receive the same pay as those of the standing Army, and cannot be much inferior to them in intelligence!

For a month in each year the Redif is called out for training. Not the whole battalion—the six contingents in the absence of the second forming but one—only four-sixths thereof. The Militiaman consequently in the course of his six years' service in the force goes through four trainings.

I was afforded the opportunity in the vicinity of Constantinople of closely inspecting a Redif brigade. It consisted of two battalions, come the previous day from Asia Minor, leaving that evening for the Herzegovina—eight companies of 100 men, splendid fellows. Called out in mid-harvest from a district depopulated by famine, for a cause in which they took no interest, discontent might well be expected to prevail. Never, though, was the Padishah more enthusiastically saluted than by those 1,600 voices. One could but feel that with such men any difficulty might be surmounted. But who was to lead the way? One officer, of wretched mien, to each of those strong companies. What mechanical force was there to support the physical? Long rifles and scabbardless bayonets in the case of one battalion, short rifles and swords in the case of the other. Uniformity alone in the dirty, utterly unserviceable state of the weapons.

As to the last unit in the auxiliary forces—the National Guard or Mustafiz—it is the very embodiment of theory. It boasts neither organization nor arms, nor officers, nor cadres save in misrepresentations to the greatest autocrat, the most deluded monarch of the civilized world.

Now as to the Imperial Navy—it consists of twenty-six ironclads, embracing every description of battery, but with, I understand, too thin plating for these days. The Officers are *au complet*. The men about half. How far either the former or the latter are fit for sea, I will not presume to opine. Practice in navigation they certainly never have. All the year round this glorious fleet lies in idle state in front of the imperial palace. The Sultan gazes thereon from the presence-room of Dolma Bagtshé, and believes when he is told that he rules the world. There are none in "his" service who will undeceive him. He knows no foreign language, and the Turkish prints are under the censor. Financial difficulties are unknown: dreams of troubles to come do not disturb the Imperial slumber.

The men of the Army and Navy now have to be considered. Of them as individuals it is difficult to speak in exaggerated terms. Whether of the standing Army, of the auxiliary forces, or of the Navy; whether of the capital or in the provinces; whether in garrison or in the field, these tall, robust men have no thought save that of duty and implicit obedience. Wretched, deplorably wretched, as is the controlling force, crime is so rare that there is no regular scale of punishment. Every order is executed to the very letter. Long arrears of pay produce no grumbling. Drunkenness, absence, desertion, are well nigh unknown. In short, to quote that distinguished officer, Admiral Hobart Pasha, Inspector-General of the Imperial

Navy, they are the finest men in the world—hardy, brave, active, intelligent, patient, enduring, submissive, obedient, beyond comparison.

Thus do I complete my review of the Turkish forces. I presume to hope that I have succeeded in showing what splendid material they contain. Nor have I sought to gloss over their numerous shortcomings. The men are admirable, but the officers very imperfect. The guns are numerous, but there are no horses to drag them. The rifles are of the best type, and enough of them to give one to each Mussulman in Stamboul, but there are no cartridges. Truly the engines are ready but there is no motive power. The ally of Turkey will have to supply it. Officers, horses, waggons, ammunition, method must be provided before the Turkish forces are really fitted for European service. The proof of this is, I fear, to be seen in the operations still pending in the Herzegovina. Not one of the defects which I have enumerated but is there felt, and none more so than the continual change in the chief command, and consequent reversal of plans. Yet it is also positive that the moral support afforded to the insurgents by the three Emperors, and probably the pecuniary aid furnished by one of them, has a very great deal to do with the protracted nature of the struggle. It cannot, however, long continue, and it is much to be hoped that so soon as peace has been restored, some energetic Pasha (and none better than the deservedly popular Hussein Avni, the soldier-vizier) will be placed and maintained at the head of the Army, and energetically complete the building, of which so fine a foundation exists. The carrying out of the 23rd Article of the celebrated Khatthiy Humaion, by the admission of Christians into the Army on the principle of general equality, would facilitate the all-important infusion of foreign superior element, would free the country from much of the burden and depopulating consequences of the conscription, and then the Turks will take a high place in the European military family.

The Military aspects of the Eastern Question.

Now, Gentlemen, I solicit your most earnest attention. We have done with statistics, and it remains for us to consider what military changes twenty years have wrought in the *bête noire* of modern politics. First of all, what is the Eastern Question? There are probably none here, but there are many outside who totally misapprehend it. To some it imports the maintenance of British Empire in the east. In the minds of some it is vaguely connected with religious questions—the tyranny of Mahomedan over Christian, the ownership of a silver cross at Jerusalem. Not a few either are there to whom it has no meaning, who have never sought to present it to their minds in a clear and definite form. Before them I would thus put the Eastern Question, "*Whether Turkey in Europe must be maintained intact?*" It is positively this, nothing more and nothing less. You well know that I am not here to uphold the merits of the affirmative, or the negative answer. But it is obvious that if all the European Powers interested therein were agreed upon the point, there would be no Eastern Question at all. Therefore it is clear that as there is a

decided Eastern Question, the interests of some States point to one solution, of other States to another. Without defendants there could be no litigation, without aggressors there could be no war. It will not consequently be foreign to my rôle to inquire without prejudice, first, what Powers are interested in the Eastern Question? and, secondly, how do they severally view it?

Historical recollection and geographical knowledge will lead you to a ready answer. The greatest statesmen of times gone by, the eminent names in British story, regarded it in a positive light. Frederick the Great, Napoleon, Talleyrand, and Metternich; Chatham, Pitt, Wellington, Canning, and Palmerston were all agreed upon the subject. During the present reign we have undertaken a long, a costly, and a sanguinary war to uphold the integrity of the Ottoman Empire. Is that integrity still of interest to us? Nothing has to my knowledge occurred to render it otherwise. In it we still, with Turkey, Austria, and France, are primarily interested. In it Germany, Italy, Greece, and Spain are much, though perhaps secondarily, concerned.

But have I not omitted from this enumeration of nations one great state—the mighty empire which stretches from Vistula to Volga, and even further into Asiatic desert, from White Sea to Black—Holy Russia? Can this be on account of her indifference? No. The Eastern Question is of greater importance to Russia than to all the other countries put together. Is it viewed at St. Petersburg according to what I may call the aggressive and expulsive, or the defensive and retentive theory? I will not here presume to say. Vast as is the area over which the commands of the Romanoff are obeyed, it is clear on the face of things that the material welfare of the Empire requires a surer, a safer, a more accessible maritime exit than is at present possessed. More than once, in this theatre and elsewhere, have I dwelt upon this cardinal point in the faith of every Russian. More than once have I craved observation for the question we are this afternoon considering—have thrust forward its claims to attention in preference to that most mythical, that most unfounded, yet, for some, that most absorbing belief in Russian designs upon India. Her traditional ambition, her obligatory ambition, her true ambition is wholly and solely directed to securing a passage, safe in peace, safe in war, from the Euxine to the Mediterranean. So let it be, and a new rival enters upon those waters. Judge for yourselves, Gentlemen, what existing interests will be thereby endangered or promoted.

But let us see how in a military sense—and I will take that adjective to comprise naval—the Powers named are situated as regards a definite solution of the Eastern Question.

First of all, as to Turkey herself. You have had her land and sea forces arrayed, feebly though it may be, before you. I concerned myself solely with the fez-bearing, but add thereto now the armies of Roumania and Servia. Both are vassal by name, vassal by tribute, to an indulgent, never interfering Suzerain. Roumania, with a Teuton Prince at the head of affairs, has a Prussianized army. Every day adds to its efficiency. Sixty thousand men, or thereabouts, it numbers, and these, if set in motion by the national feeling, alone are ready to main-

tain the secure and guaranteed position, the practical independence and prosperity the Principalities now enjoy. I do not say that the Porte can absolutely count upon this armed assistance. The favour lately shown to prominent Roumanians by a neighbouring sovereign, the fluctuations of power, may endanger it; but certain it is, that the match that fires the smouldering flame will with its first spark change the military tenure of the territory lying between the Pruth and the Danube.

Servia we must regard with different eyes. The ruined battlements of Belgrade perpetually remind the otherwise unemployed inhabitants of the late Moslem occupation; yet Turkish rule is no more actively felt than in Roumania. It is only the capital, not the ignorant, thrifty population of the interior, that seeks to break asunder from the light Osmanli yoke. Nor is the enmity unallied with Slavonic sympathy; yet there exists but a sorry army, large on paper—90,000, I believe—but of little real value. It possesses few officers, few rifles, fewer guns, and less organization. But over a restless people, Prince Milan Obrenowics anxiously holds his sceptre, while the rival Karageorgevics awaits, five leagues distant, for a change in the halting and whimsical affection of Belgrade and the Skuptschina.

Now it is apparent that, if in that, let us hope, remote contingency, Russia seeks to move by land, on the Ottoman Dominions, the first step must be the occupation of the flat Roumanian lands. Such might not be difficult, but beyond there lies the broad and rapid stream, des Schönen blauen Donau. West to east it runs; northern bank flat, open, and well adapted for armed manoeuvre, commanded, though, by position succeeding position on the southern shore. An able Captain, with an active, intelligent force of cavalry, who chose his positions carefully, would long defend the fluvial passage. His centre would rest on Rustchuk, and either wing on Widdin and Silistria. Of them, though, anon. When at length the passage was forced, the Turkish troops would fall back by Shumla, on the Balkan range. The position of Shumla alone would not be overcome without difficulty, and then the invaders, weakened by their Army of occupation in Roumania, by the crossing of the Danube, by the corps detached to mask Widdin, Rustchuk, Silistria, and Varna, would find a very serious barrier in the passes and defiles of the Balkan.

But if the double-headed Eagle elect to make a feint only on the northern frontier, and to leave for subsequent subjugation the fortresses on that quarter, choosing rather for the real attack to make a sudden dash on the capital by sea and land, there would be much to recommend such a course. Disembarking fifty thousand men in the undefended Gulf of Bourgas, the fate of Stamboul might be a question of days. Do you know the Bosphorus, that narrow passage, with swift and treacherous current possibly, but yet with water so deep, that a vessel of the largest draught may anchor almost within a stone's throw of the shore? On either side crest succeeds crest. Each offers an artillery position. Fortified and defended, a forced passage would be almost impossible, but what is the state of the case? An indifferent work is to be seen on the Asiatic coast,

nothing besides. The depth is too great for torpedoes. How it is that the Turkish Chief of the Staff devotes his talents, his energies, his resources to the erection of barrack and store house upon barrack and store house, while the heights of the Bosphorus, the only landing place on the Black Sea coast, are undefended, while Varna is ill-guarded, Silistria is left in its ruined state, while Rustchuk falls into disrepair, while Widdin and Nisch are scarcely worthy of the name of fortresses, is for him to explain.

The Russian Fleet would co-operate to some extent with the land forces. I take it to be very uncertain how much work is going on in the dockyards of Nicolaïeff; but from such sources of information as are at my command, I am justified in assuming that the Black Sea Fleet is sufficiently strong to protect an embarkation at the point I have indicated. Whether it be absolutely a match for the Turkish ironclads is very doubtful; but you will perceive that I consider this plan in the light of a *coup de main*, rather than in that of a campaign of which the defenders and their allies have had long warning. Russia possesses such extraordinary facilities for concentrating troops and material of war without attracting attention, that she would probably find it easy to drop upon the Turk unawares. I doubt even if three ironclads could leave their moorings in the Bosphorus for a few days' cruise without a month of preparation.

Let us now see what light Great Britain could shed upon the matter. Recent events have not materially altered the position of affairs. The Eastern Question is indeed connected with our road to India. But think not that this road is solely one for the conveyance of our troops, for the passage of our ships. The road to India means, indeed, one for the transit of men and merchandize, and also one to the hearts, to the loyalty, to the submission of the vast Mahomedan population to the Supreme Power. This loyalty, this submission, depends much—those who have been in India know how much—on the alliance of the Queen's Most Excellent Majesty with the Caliph of the Prophet, the Sultan of Turkey. I have before shown you how obedient to rulers of this creed is the Mahomedan soldier, and even so is the Mahomedan layman. The infringement of religious precept could alone break through this rule.

Nor are the new rights so patriotically acquired over the Suez Canal, any positive assurance that the material road to India will be for ever secure. So narrow, so shifting, so difficult is the passage that even in time of peace the speed of four knots an hour must not be exceeded. Often and often a vessel runs a-ground. The treacherous sand is here to-day and there to-morrow. The buoys which yesterday marked the course have now to be moved. I am informed, credibly informed, that a single boat in a single night is capable of stopping all safe navigation through the Canal; and will not the able and renowned Officer, who, if report runs aright, is entrusted by leave of his Tsar, with the portfolio of war at Cairo, see that land defences guard the waterway? In short, be not surprised, if, on some future day, the existence of a Treaty, that you now little dream of, is brought to light.

Do you, then, go with me in the theory that Great Britain is pre-eminently interested in the great question before us? The preservation of Turkey is closely connected with our own highest interests. How do we, then, stand as regards the question in a military aspect? As matters are, I very much doubt if any active interference would have such a reasonable chance of success as to justify its being attempted. The Army which is available for continental operations is too small to render any vast assistance, unless everything be prepared, everything favourable, to the execution of a fixed and definite plan. It might be otherwise, were the Militia liable for foreign service in time of war; a practicable scheme I mentioned here last summer. But we can only take things as they exist. On any attempted rupture of the present *status quo*, it is probable that our Mediterranean Fleet would be despatched to the Dardanelles. A large portion of the garrisons of Malta and Gibraltar would be moved at once eastwards. Within ten days forty thousand regular troops would be despatched from our shores, and ten days later might disembark on Turkish soil, *i.e.*, at least three weeks after the declaration of war. Remember that, until that declaration, we could not move a man, for such movement would assuredly constitute a *casus belli* of itself. Three weeks in this age is a long time, and, as you will have gathered, my deliberate opinion is that the Turks do not at this hour possess the means of resisting any skillfully planned and energetically conducted invasion. They will not submit quietly,—a St. Bartholemew's day might recur,—but I do not think that any firm stand could be made, reasonable chances favouring both sides. Nor is this all. Any British Army sent to assist Turkey, to uphold our policy of ages, and from which it would be fatal to depart, would meet with every obstacle long before it came face to face with the aggressor. Nearly everything would have to be furnished from the Fleet, for in such a state is the country that it is almost deprived of the usual means of sustenance. The entire transport would have to be provided. At home, even the service is defective. How, then, would it be possible for us to establish it, within the required time, ready for an arduous campaign, thousands of miles away? Horses, again, we should have to send. Have we them here? Can we have them there? Then, also, engineer and pontoon trains, to say nothing of ammunition.

This is now the state of affairs. But let us hope it will improve. If, say a million sterling were spent now in fortifying the Bosphorus, Bourgas, Varna, and the line of the Danube; in organising transport; in providing horses; it might save many millions to the British taxpayer hereafter. If Officers be sent, or at least encouraged, to go and learn Turkish, to instruct the troops, to stimulate the Navy, then British arms will be able successfully to co-operate with Turkish battalions. One other matter, too, is all important, whether with or without English interference, *viz.*, the completion of the strategical railway from Adrianople to Shumla. Three years ago was the contract signed by Baron Hirsch, on the one part, and the Turkish Government on the other, but intrigue has successfully postponed the carrying out of the work. Without that line, I do not see how troops

could be moved up to the Danube—how they could be supplied with field equipment. It would bear, too, with the utmost importance on any assistance we or any State gave to the Sultan. Its immediate construction ought therefore, I submit, to be insisted upon *coute que coute*.

The position of Austria, as regards the Eastern Question, now demands consideration. Any encroachment of Slavonic power might inconvenience her in the highest degree. Despite the recent Note, despite any temporary uncertainty in her views, I cannot but think that my query must be answered in the affirmative at Vienna. Already overburdened with heterogeneous races, it cannot be that the House of Hapsburg seeks to bring more turbulent tribes and greater discordance into its midst. I refer to the acquisition of sovereign rights over the Ottoman Provinces now the subject of so much concern. Everything points to a firm accord between the Cabinets of St. James and Vienna, on Eastern Affairs, and this has an important bearing on the military aspects of the question. Even without Great Britain, any active support afforded by Austria to Turkey must materially change the plans of attack. Moving, as her troops would do, on the invader's flank, the northern Army of offence would have to be one of surpassing magnitude, for I entertain doubts as to the reception that the Muscovite would meet with in Roumania, if that excitable population was influenced by the approach of Austrian succour. In a very few days, 300,000 Austrians might man the Danube. To Bazias there is perfect railway communication, and the vast fleet of river steamers is entirely in the hands of the Viennese Government. Austria is consequently able to send the maximum aid to the declining Ottoman, and if co-operating with England, as I trust she would, any attempt to dismember the Turkish Empire would meet with summary punishment.

Time was, and a very short time back, that another State would have claimed a positive right to be consulted on any reappearance of the question of to-day. But for the present, that time has gone. The influence which, not long ago, was paramount at the Sublime Porte has completely faded. There are many present who well remember how gallantly the French fought side by side with them on this very matter. How the Anglo-Franco Turkish alliance silenced the questioner is matter of history. But now, France will assuredly not interfere actively in any solution of the Eastern problem that may arise. The Russian alliance is the first consideration. It may cost much, but to Gaul it is worth anything, and of that every Frenchman is convinced. France, then, has ceased to influence the military aspect of the question.

Even so with Germany. On the other side of Whitehall, it was authoritatively said, I believe, and not so very long ago, "The Eastern Question is for Germany a matter of purely secondary interest." This too is obvious. The German interests in Turkey are very small. Those in Russian friendship enormous, no less so than to France. Teuton intervention in any Russian mode of breaking in upon the situation, means for Germany a double war, each requiring all the force, military and civil, of the nation; for France rehabilitation, and

victory. Close by me, though, is an Officer who, the other day, told me with serious face that all had been prepared in that terrible "general stab" for the invasion of Britain, the annihilation of France, the subjugation of Russia, all at one and the same time. I trust my friend will survive so appalling an idea, and live to see that the new Empire is and must be peace, until the inevitable war of revenge has been reckoned among the horrors of the past.

I need not detain you with any analysis of the aid Italy, Greece, or Spain might bring to the question. Highly improbable is it, indeed, that they would do aught in a military war, but to each of them the present condition of things is most favourable to their prosperity. To Greece, through which I have lately travelled, is this especially the case. So is it viewed by every Athenian of intelligence. But, mentioning Greece, I cannot refrain from inviting attention to a scheme projected by the ancients, but, owing to scarcity of funds and local disturbances, never carried out—the piercing of the narrow Isthmus of Corinth, the junction of classic *Ægean* with Ionian Sea. To Austria, to Italy, it would be of vast benefit. The dangerous doubling of Cape Matapan would be avoided; and, in a military sense as regards the Eastern question, and in a commercial sense, such an undertaking recommends itself to politicians and financiers.

Gentlemen, I have done. I trust I have not over-taxed your patience, nor said aught upon which any erroneous construction could be placed. I am grateful for your attention. But, in conclusion, let me beseech you not to let your investigations end at the point to which I have presumed to carry them. Consider the Eastern Question well in its magnitude, in its importance to our beloved country. Consider it well, not in any sophistical aspect, but in its true bearing to British interests. The solution will then be left to time, and even, I may say, to another generation.

LECTURE.

Friday, May 12, 1876.

MAJOR-GENERAL SIR GARNET J. WOLSELEY, K.C.B., G.C.M.G.,
&c., &c., &c.. in the Chair.

THE ITALIAN ARMY.

By Colonel the Right Honourable Lord WAVENBY, F.R.S., A.D.C.
to the Queen.

IN the address that I shall have the honour to give you this day, I am perfectly aware there exist very considerable difficulties, that the task is a very heavy one, but it is so intimately connected with the subject that closely engages our attention at present, namely, the re-organization of the Armies of Europe, and also is so conjoined with the fortunes of that great country, the Peninsula of Italy, over the progress of which we have watched with much anxiety, that even at the risk of giving a very incommensurate and insufficient idea of the circumstances which may be more plain to me in my imagination than I may be fortunate enough to make clear, I am still disposed to undertake the task. I had hoped, indeed, that on this occasion one of the old soldiers of the long series of successful and unwearied struggles which I shall now have to relate to you might have been present. His Excellency the Italian Ambassador, had he not felt the paramount duty of attending the Court of Her Most Gracious Majesty, would have been present on this occasion, and thus I should have had the advantage of that enlightened and personal criticism which would have corrected the errors that I must needs, I fear, fall into.

The subject we treat this day is not one of the mere organization of the military force, but is so interwoven with the history of the country generally, with its improvement and defence, that you will permit me, I trust, to refer to some historical points before I proceed to the question of military organization. After the close of the Napoleonic struggle, one dead level of repose settled down upon Italy, made heavier and more grievous to her people by the political incapacities that restrained the exercise of constitutional rights. With the exception of one small State in which free action, both as regards the

people and as regards their government, was kept alive; with that exception, all the rest were held in a bondage the more hateful, that it was maintained by foreign bayonets. It is difficult to procure any map of Italy which sets forth very clearly the position which the small Duchy of Savoy, afterwards called the kingdom of Sardinia, occupied with regard to the rest of the Peninsula. But in the colours of that map you will see the proportion in the north-west corner which that kingdom occupied. So situated and so circumscribed, it is a matter of marvel that it should become at last the governing and motive power of Italy. As I have said, a repose which is not peace, rested upon Italy, until at last the dry bones began to move, and a new spirit was breathed into them. The proclamation of the Spanish Constitution at Naples, in 1822, gave the first evidence of reviving power and sentiment in any Italian country, too soon, unfortunately, to be quenched in defeat, for the progress of the Neapolitan Government was checked by the disastrous affair at Benevento, and then, for long years, there was no more speech of war. But the spirit was alive, and as time rolled on the Piedmontese Government more and more developed constitutional action, and began to prepare for the contest which it was seen was inevitable. I remember, in 1836, as I have mentioned before from this place, Field Marshal Radetzky prepared two alternative lines of defence in the valley of the Po. The attack was expected by him from the west, and from the west it came, but not in the shape which he anticipated. He believed that the French would exercise their newly developed power in attack, probably with the alliance of the Sardinian kingdom, but he little expected that Sardinia would confront Austria single-handed. We know the result of that bold and resolute movement—armies broken, the Sovereign an exile, and dying of a broken heart in Lisbon. But not, therefore, did the kingdom of Savoy abandon its true and noble confidence in the regeneration of Italy. Years passed on, and again the arbitrament of battle was appealed to by the sub-Alpine kingdom, and with a result which, as we know, gradually brought country after country into that mass of power which is now reigned over by Victor Emanuel, the King of united Italy. In the circumstances of those wars there were some curious and remarkable results. From the beginning the Sardinian kingdom had to rest exclusively on its own strength; the fighting power was gradually developed into a greater efficiency, step by step, as each successive government declared its adhesion, because this must be borne in mind, that no portion of Italy was conquered, so to speak, but that, being set free from the rule of its native government, it voluntarily joined itself to the Sardinian State. There were, besides, some conflicts fought single-handed—some disastrous—none dishonourable. There were battles fought in concert with the French Army, and in result of these, though falling short at the time of what might have been anticipated, though Italy was not conquered, as the French Emperor had promised, “from the Alps to the sea,” yet progress was attained; it was evident that some future day would give to Italy all that she could desire, just as previously the protracted resistance, made both at Rome and at

Venice, gave promise of what might be hereafter the lot of that country in a better day. And so at last Italy, with the exception of Rome, was won. "From the Alps to the sea," no foreign soldier rode or mounted guard on her soil, and the question then was, how, from the discordant materials of the Italian forces, a national Army could be constructed which should be sufficient to hold the country, first against invaders, and then against powers that might seek to enforce compromising alliances. Now, it will be observed that the different districts of Italy are separated from each other, not merely by natural bounds and limits, but also by the diverse genius and fashions of their people. The Northern Italy of Savoy has more of the feeling of the races beyond the Alps; the Lombard and the men of Venice are of one mode of thought, and those of the States of the Church and the Emilian Legations of another; and so of Tuscany, of Naples, and of Sicily, and the problem was, how to mould these into one homogeneous mass.

But, before I proceed further to show you how worthy the Sardinian Army was of the great task that lay before it, let me, from the simple records of its Army List, mention some facts which are well worthy of remembrance. Sardinia, or the new kingdom of the Savoy Duchy, has been known in the successful scientific wars of Europe since successful scientific wars began. We remember that the feuds and wars of the middle ages eminently brought to the surface the great Italian qualities of fiery courage, of resistance, of endurance, and of scientific application of mechanical means, so far as they were understood, in engineering and artillery, but it is not remembered, probably, that amongst the regimented forces of Europe few or none are older than the Italian. I find, in the Army List in which an account of the different regiments is given, that the third regiment, called that of Piedmont, dates from 1637. I believe that is older than any regimented corps in our country, and older, I think, than any borne on the rolls of France, or Austria, or Spain, or of any military power except that of Russia. These regiments distinguished themselves in many battles of the latter part of the 17th century and the whole of the 18th century. It is scarcely necessary for me to read to you the long roll of their distinctions, but those who remember the wars that have occurred in the last thirty years, and especially some to whom I now speak, who were companions of the small Sardinian Army by the waters of the Tchernaya, well know that they were soldiers, and have been soldiers at all times, with whom the English soldier might well be proud to bear privation and to mingle his blood. As of the infantry, so of the cavalry and so of the artillery and engineers. In this Army List you will find that gradually the Armies of the different countries that joined themselves to the sub-Alpine kingdom were absorbed and are borne on their rolls; but here was an enormous difficulty. Austria, with her repressive policy, had forbidden the youth of the Milanese, of Lombardy, and Venetia to cultivate their natural genius for arms and warlike science. The troops of Tuscany were trained on the Austrian system, but were comparatively small in number: the Neapolitan Army was trained and drilled

under the last King and his predecessors to an extent which gave them an admirable appearance under arms, and the thorough "*allure militaire*" which is so desirable; and yet, such was the fault of the Government, that this Army melted away before Garibaldi's red "*camisade*" as the snow before the sun, but has since re-entered in the persons of its Officers into the service of the King of Italy. I say in the persons of its Officers, because this is a point to which I shall direct attention. The men of the Italian Army undergo a more constant and searching change than those of any Army raised by conscription. How is this effected? In the administrative system of the Italian Government the principle is that a Minister of War shall lay what is called a "project of law," specifying whatever alterations he may desire to propose, first before the Chamber, and then before a Committee to be appointed by the Chamber. There is no examination of witnesses or appointing Committees in our sense, but, the Committee, generally some sixteen or seventeen Deputies, examine the project themselves, and require such explanation from the Minister as may be necessary to satisfy themselves of the feasibility of his plans. These are very elaborate, and are carried out with a care and attention which is very remarkable. The volume before us comprehends the three projects of law on which the organization of the Army is now carried out, and it is exhaustive, as may be supposed, from the searching qualities of Italian genius. It goes into every question that can possibly concern the soldier, from the chief of the Army to the youngest recruit in the ranks; and some of the conclusions are exceedingly noteworthy, being drawn, not only from the personal experience of the Committee, but also from the incorporation of that which appears to be advantageous in the practice of foreign Armies. For instance, to commence with the main point of the recruiting, with regard to the exhaustive principle on which it should proceed, there was a very long series of discussions as to the nature of the service in the first instance, and that was decided to be personal conscription for every male subject in Italy, not disqualified by physical incapacities or exempted by certain family circumstances from service. Then came the question, what manner of Army there should be. And it was decided that there should be first an Army which could take the field, with a reserve, an Army answering to the Landwehr or the Militia of our country, and then a communal Militia, resembling the local corps which obtained in this country during the great French war; and, finally, Alpine corps, which are regarded as exclusively designed for the defence of the mountains. Then came the consideration as to whether there should be any exemption, or what provision should be made for those brought into the ranks. The principle is at present to raise the troops, 90,000 men, in what are called two categories. The first category consists of 65,000 men, who are raised according to proportions determined on a fixed system, throughout the military districts of the country; and this proportion joins the colours and remains with them, three years for the infantry and six for the cavalry; and the 25,000 remaining in the second category are taken to maintain the original strength of the Army in

line during the years of their service, that is to say, at the rate of about 10 per cent. And it is expressly laid down that those who happen to be placed in the second category, that is the category of temporary exemption, or deferred time of service, have no right, on that account, to be placed in the third category, that is to say, the Militia of the provinces or communal, but shall continue to form the second category. And I may mention this, in order to show how thoroughly a fair and true spirit pervades the whole of the Italian system. It was laid down expressly in the deliberations of this Committee, that there is only one hardship in forced service, and that is inequality.

Then with regard to the command of the Army. In the Italian service there is no permanent rank above that of Lieutenant-General. For the great commands, an officer styled "Army-General" is selected, equivalent to the temporary rank of General Commanding in Chief. And this question is also argued out with a greater closeness and at greater length than I care to detain you upon at present; but in this argument, and this shows you how thoroughly they have investigated every question, the Committee remark particularly upon the singular felicity with which H.R.H. the Field Marshal Commanding in Chief in this country has managed so to perform and carry forward our military institutions that he has made the armed soldier acceptable to his countrymen in a free state.

Then in this further analysis that I am speaking of, with the close prevision that is applied to all these subjects, I find in the distribution of an army of 100,000 men the proportion of infantry of the line to be 66,740, of bersaglieri 11,032, cavalry 4,849, field artillery 6,810, garrison artillery 4,086, pontoon train 572, engineers 2,179—a large proportion,—and transport 3,732. And the remark on the cavalry is this: that whereas cavalry is an arm difficult to maintain, and expensive also, and on these accounts to be adopted with much circumspection; that though certainly cavalry regiments may make a more brilliant campaign, yet for a country provided with sufficient fortifications, with an infantry it can trust, and with arms of defence, and with determination, as we say, to expend the last man and the last shilling, a brilliancy is not required which is in excess of what is necessary for the defence of the country.

The proportions of the conscription, of which I have spoken are somewhat remarkable. I have before me a table giving the estimated proportion of troops from 1872 to 1885. To avoid confusion, I have taken three periods—1872, 1878, and 1885. The annual contingent of 1872, permanent and in reserve, was 632,700 men; in 1878 it will be 736,700; and in 1885, 767,600. Under the first system, the troops were four years with the colours and twelve years liable to service; under the second system, which now prevails, they are three years with the colours and twelve years liable to service.

Having thus obtained their war numbers, the War Office proceeds to complete establishments with wonderful accuracy and minuteness. The artillery are to be provided with 1,000 field guns, of a description of which I shall have to speak, and with 800 steel B.L. field guns,

equivalent to our 16-pounders. The fortresses are adequately provided with artillery, and, as will appear further on, arrangements are made for the maintenance of the fortresses in an efficient state. I will now remark the care that has been taken with regard to the comfort of the soldier. The recruit is brought from hill or plain, as the case may be, but at all events, generally speaking in Italy, from secluded districts, at once into the Army, and is passed through the ranks. The system of military conscription is here carried out, I believe, to the most efficient and least hurtful extent in respect of the industry of the country. The principle is, that each Italian regiment shall have a certain proportion of recruits from different military districts, determined before-hand, that is, one-fifth from each of five different districts. Thus, though the soldier is not entirely separated from his friends and comrades of the district from which he was recruited, he is not only passed into a foreign garrison, so to speak, where he learns much of his countrymen that he has never known before, but he also learns it in the comradeship of those whom he thereby learns to respect and to appreciate. Thus, for instance, in recruiting for the infantry, I take the case of one particular corps; the first infantry regiment receives its recruits from five districts, from Alessandria, from Bergamo, from Sienna, from Naples, and from Palermo. I shall have, further on, to mention the circumstances under which these recruits are personally brought into the service.

I might detain you for some time on the general subject of establishments, but the work which has been published by our Topographical Department, "The Armed Strength of Italy," translated from the German by Lieutenant Hare, R.E., gives so clear an account, that I would refer you to its pages. There the general arrangements appeared to be very much as they are now carried out, though from time to time there must be, of course, considerable alterations. Permit me, then, for a moment, in the absence of detail, which time does not permit me to give, to ask credit for the military establishments being complete. I shall shortly proceed to give you some details as to some of the special establishments, but we are now arrived at the point that we have an army, we have the principle of appointing Officers, and the mode in which the soldier is brought into the ranks. When the soldier is in the ranks the question is, how he is dealt with. He is kept for three years nominally in the infantry, but for two years and eight months practically with the colours; he is then returned to his district, and is not allowed to remain, except under special circumstances and as a volunteer. It will be asked how are the non-commissioned officers to be obtained? Non-commissioned officers are obtained for the permanent service from battalions of instruction, which are organised very highly for their instruction on a uniform system; and amongst other points of interest to the Army, the question of how the non-commissioned officer is to be retained in the ranks is very minutely discussed. How to retain non-commissioned officers in the service is the question, and the answer is double, first in the negative and then in the positive direction. It appears that the hope or expectation of wearing the epaulette as commissioned Officers, will not retain the non-

commissioned officer in the service. For this reasons may be easily supposed. Then with regard to re-engagement, that does not appear to have been very successful, since if continued service does not decisively secure the future, no one will choose to expend in the service of the State the best years of his life, that is, those years which alone can create a sufficient provision for after-life.

But there are two special recommendations, one to recognise the right to employment, both staff and civil for long service; and the second is, and this a very remarkable one, and as far as I know novel, to create an intermediate grade between the Italian non-commissioned officer and the commissioned Officer. The Italians believe that these provisions will succeed very well, and this is one of the points on which we should have derived so much advantage from the opinion of the distinguished General, had he been present. I mention these things to show you the care and attention which are paid to regimental and other matters. Now I will take the case of the various duties and points of interest which come under the notice of the committees on military matters. Of the recruiting I have spoken. Then before these committees such matters are discussed as extraordinary expenses for the defence of the country, for the organization and *matériel* of artillery, for heavy field guns, for firelocks, for mobilisation of the Army, and for the defence of the sea-coasts. Another matter that has very much occupied the attention of the Italian Government in these references, has been the position of the Topographical Corps in the Italian Army. And this is remarkable; the Italian staff has been but twelve years in Sicily, and in that twelve years, with no very great amount of help, a map has been completed of contours, in beauty of execution in no way inferior to any that I have seen. In the report of this department a highly important scientific question is discussed, which I recommend to your notice, and which no doubt has attracted the attention of our Survey department. The question is not only the scale on which military plans should be drawn, but whether every section of a military map should be a precise portion of the great system comprehending the kingdom, or whatever other district may be selected, just as it is in actual fact on the ground. And here discussion arises as to the variable and comparative difficulty of forming such maps as shall be absolutely and positively true in reference to all points, if they be countries running north or south, or east or west. All scientific Officers present will at once see the difficulty arising from the different parallels, and this is what the Italian topographical staff have addressed themselves to obviate. The system adopted is called the polycentric system; that is to say, each separate sheet, instead of having an assumed uniform reference at all points to all other sheets, is taken in reference to the particular selected district, so that the whole of this district, though it does not absolutely and perfectly correspond with the entire surface of the larger and outer districts, is complete in itself, and one centre of proportional reference is taken in each sheet or district, and is therefore called the polycentric system, which now attains, I believe, most successful results in Italy.

Before I pass on, let me speak of the purpose for which alone this

Army is intended, and that is, of national defence. There is a proverb now, derived from one of these reports, which says "*L'esercito che ha fatto l'Italia fara anche gli Italiani.*" The Army which has made Italy a State is making the Italians step by step, in bringing all classes of men of all her provinces together, to honour and respect each other, through mutual knowledge, and is prepared especially in the person of its officers for sacrifices of any extent, for the advancement and for the defence of their country, as appeared in these reports.

With regard to the purposes of defence, there may be said to be five classes of war in Italy—the war of the Alps, the war of the Apennines, the war of the river system, the war of the coasts, and the war of fortresses. For the war of the Alps, the passes are being strongly fortified with small forts and heavy guns, and garrisoned by the Alpine corps. For the war of the Apennines the light field guns are designed, because, as the Italian Minister of War said to me, "What could we do in our mountains with your great and heavy artillery?" For the war of the plains, there are troops fitted for close battles. For the war of the fortresses, there are the old works, relics of Austrian rule, which have been placed or retained in a condition of service, and there is no spot of possible offence to the country, I firmly believe,—from the returns I have now lying before me,—for which absolute provision for defence is not made or projected. And there is this remarkable in the calm courage and foresight of the Italian Government, that they never hesitate to declare what the objects of their defence are. In what we should call our estimates, they set forth that Rome is to be fortified by an entrenched camp, to secure the capital from sudden attack, and to guarantee it from the risk of bombardment with an ordinary siege-train. That Capua is to be fortified as a *dépôt* for stores, and of "*appui*" for the defence of Naples, and would make her independent of the chances of Upper Italy, to protect the capital against attack from the south, and to cover the retreat on Naples of an Army which might be obliged to abandon Rome. And a nation who are so determined to sacrifice the brilliant in favour of the useful, who do not hesitate to declare, in the face of day, what their intentions are, must needs cause themselves to be respected, even in this first flush and youth of their union. Again must be noticed the war of the coast, and it is here that Italy has so great an advantage. Italy has the same advantage, from her long sea coast and her growing maritime power, that makes England, for imperial purposes, the strongest military power in the world, that is, in the possession of sea-bases from which expeditions can be launched against the most remote of her enemies.

Now, having given very briefly and very imperfectly a general outline of the Italian Army, let us see its application.

First, as to the recruits. The levies of the military district of Rome were, on the first of January in this year, taken for the first time. It was a matter of some little anxiety, for Rome had been accustomed to no soldiers but mercenaries, and I, with some curiosity, watched the recruits. Nearly 1,700 men walked into Rome, in the

early days of winter, from their mountain and village parishes. They came clad in goat-skins and shod with sandals, and such equipments as befitted the mountaineer, but with small thought of wearing a shoe, or putting on a uniform or a shako. H.R.H. Prince Humbert did the British Officers the honour to request their attendance at the inspection of these levies. 1,672 were due upon the list, and 1,625 were in rank. Although only ten days together, the teachable and docile qualities of those young recruits, shown in steadiness and aptitude for service, reminded me of the race from which they sprang. It was a remarkable sight. Those of my hearers who have been at Rome will remember that the great parade-ground is formed of the camp of the Prætorian Guard, the famous, though turbulent soldiers of the Empire. The parade stretches below the city walls; beyond are the magnificent hills of the Sabines, the Samnites, and the Marsi, those men who kept republican Rome at bay for hundreds of years, and at last were only conquered into allies. These very men were the ancestors of the recruits who were now to form a portion of the Army of Italy. I may be permitted to refer to a quotation which then flashed across my mind. Horace, in speaking of the Rome in his time, and how the youth had degenerated from their fathers, says:—

“Non his juvenus orta parentibus
 Infecit æquor sanguine Punico,
 Pyrrhumque et ingentem cecidit
 Antiochum Hannibalemque dirum;
 Sed rusticorum mascula militum
 Proles, Sabellis docta lignibus
 Vereare glebas et severæ
 Matris ad arbitrium recisos
 Portare fustes, sol ubi montium
 Mutaret umbras et juga demeret
 Bobus fatigatis amicum
 Tempus agens abeunte curru.”

My rough English for this seems to be thoroughly realised:—

“And yet in sooth 'twas no such youth from parents such as these
 Who dyed in Carthaginian gore the level of the seas;
 Smote Pyrrhus of the ruddy locks, and stout of lith and limb
 The stalwart chief Antiochus, and Hannibal the grim;
 But manly seed of rustic breed, themselves old soldiers made
 In youth to turn the stubborn clod, with Sabine pick and spade;
 And homeward bear the billets hewn as thrifty mother bade;
 What time the sun o'er mountain ridge was flinging
 Swift shifting shadows over fell and scaur;
 Lifting the yoke from wearied oxen, bringing
 A pleasant hour with his departing car.”

The equipment of the infantry is useful and serviceable in a great degree; and they have a most ingenious manner of carrying their spare ammunition. The Italian soldier fights but with one pouch; and for a long time I was puzzled to know how the ammunition was to be carried unless with the trouble of drawing every spare cartridge from the pack. But I observed in the upper part of the pack a packet which I thought contained the spare shoes. I asked what it

was. "Oh! it is the spare ammunition." The spare ammunition is placed in a ticking cover in this packet, and if the soldier requires fresh ammunition, he undoes the button, raises the left shoulder, and out falls the cartridge whether he be fighting in line or skirmishing. Then with regard to the Bersaglieri, those wonderful troops. They are picked men, the minimum chest measure is 33 inches, and they answer in a general way in appearance to our stout drivers. Their pace, and that of the Italian infantry generally, is rapid and somewhat exhausting. The pace was originally 160, now increased to 170 gymnastic paces, which are 39 inches, the ordinary pace of 30 inches 116, and the double is 136, of 32 inches. I do not know how long they can keep up this pace, but still it is very formidable, and in the case of the Bersaglieri is shown to be very effective.

With regard to the cavalry, two innovations have been introduced, one, as it appears to me, of undoubted merit, and the other somewhat doubtful. The Italian cavalry, the light cavalry especially, skirmish extensively, but the skirmishers leave the sword on the saddle when they dismount for the purpose of fighting with a carbine armed with a bayonet. The valise is suppressed in the service, and its place is taken by two saddle bags of sheep-skin, which have a very soldierlike and neat effect. The saddle is so stuffed that there is always a current of air passing over the back bone of the horse, and yet apparently does not shift; the saddle itself rests on a blanket folded in four.

With regard to the artillery, there is a special gun which I shall now have the pleasure of mentioning. It is a gun of very light draught, and I will ask the meeting to understand that those sketches represent actually and accurately the field-day, to which the War Minister kindly invited British officers. The gun itself is 2.953 inches calibre. The velocity given the shell is 1,312 feet per second, and with 12° 6' of elevation it ranges 3,828 yards. The elevation for shrapnel is one-fifth greater, and it is used up to 2,515 yards range.

The maximum elevation given the gun in the carriage is 22°.

The lightness of the gun-carriage and limber, the high initial velocity given to its projectile, and the consequent long range, place the Italian field artillery in the foremost rank as to efficiency.

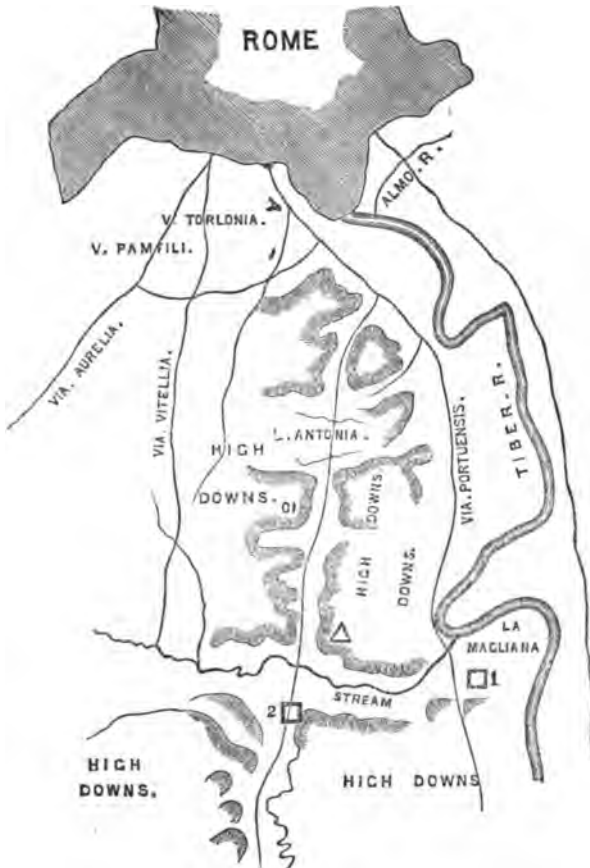
Sir WILLIAM CODEINGTON: Is it 22°?

Lord WAVENEY: The common shell at 12° 6' gives a range of 3,828. The other tables are not given. This gun is most effective with four horses and five men to a gun detachment. Two men sit with the gun, two on the limber, and one on the waggon. In case the waggons are not up, a non-commissioned officer is dismounted. This gun is the subject of a paper, well deserving reference, in the Transactions of the R.A. Institution, by Colonel Maxwell, R.A.

The diagram represents the country to the southward of Rome, and the Tiber below Rome. The idea of the manœuvre was that this body of troops was to hold their ground against a force advancing on Rome, for two hours, at the end of which time reinforcements would arrive. This stream, La Magliana, runs into the Tiber; and the lower part of this ground, with the exception of the road, was neutralized for the purpose of manœuvre. The troops left their barracks about 8.30 A.M.,

the nearest point of ground was about five miles: the furthest about six-and-a-half. They began manœuvring at twelve, manœuvred in earnest for two hours, marched back again, and there were only three men in the ambulance. The force was composed of five battalions, three of Bersaglieri and two of infantry of the line, with ten guns, six

THE MANŒUVRES OF THE MAGLIANA, JAN. 28, 1867.



Δ. Centre of defence. □1. Right flank of attack. □2. Left flank of attack.

for the attack and four for the defence, and a squadron and a half of cavalry, equally distributed. The cavalry came very little into action, as you will suppose, through not seeing them included in the sketches which represent three separate periods of the manœuvre. The custom of the judges is to take two halts during the manœuvre for the purpose of, as it were, taking count, and thus according the value of the

points verified at these periods of halt, the decision is regulated. My impression is, the condition on which the manœuvre was undertaken was thoroughly carried out, and that the ground was held for two hours.

The first movement was by massing the attacking force on that point, □ 1 (*Diagram*). The troops then moved athwart the crest of these hills till they reached the furthest point of formation, □ 2. The proper right of attack of the assaulting force was from the buildings, near the confluence of the Magliana and Tiber; the proper left of the attack from these buildings, a mile and a half to the westward. This central point was the point of defence, at which the head-quarter staff was posted. On the development of the Bersaglieri attack from the right, a portion of the troops were thrown into an oak wood in column of companies, and a portion were retained in hand. Four guns were brought up to the salient of the point Δ to bear on the Bersaglieri if they should make a flank-attack from their left or westward. This ground is exceedingly steep, and was therefore considered to be very favourable for defence. The action was commenced by heavy firing from the central point of the enemy's alignments upon our position, which was very much exposed. I have mentioned that the ground below was neutralised for the purposes of the manœuvres, and indeed it would have been very difficult to have carried troops or guns across. There is a road leading to Rome through the flat with a bridge, of which the Bersaglieri availed themselves to make a false attack in the first instance over the ground; and immediately below the central position of defence in the centre is a nullah, about wide enough to jump a gun across; but the Bersaglieri hid themselves so completely in it as in a shelter trench that from this high ground but little or nothing of the troops below could be seen.

Having made this false attack from their left, another attack was precipitated from the right which brought the defence out of the wood and left them prepared to deploy as soon as the attack from the right should attain sufficient importance. This was the closing scene of the manœuvre. The guns were withdrawn from the centre of defence towards the left flank, and then opened on the advancing troops. The skirmishing which was to protect our right was carried on to the rear, and the men were formed facing the left or false attack.

The light guns were most effectively and efficiently worked with their four men per gun detachment, and non-commissioned officers; and I saw the guns of the attacking force brought up a very steep incline in perfect order, and simply by four horses. It gave us all an impression of the hardihood of the Italian soldier, and there were officers present well acquainted with the power of infantry movement who were struck with what they call the "gliding" pace of the Bersaglieri.

My time has now come to an end. I am exceedingly sorry I have not the opportunity of impressing more strongly what I have to say; but if I could only show you the accumulation of papers and memoirs which I have had to consult, and to consult always with advantage, you would say that the difficulty of choice was very great indeed.

The chief consideration is this: The strength of armed Italy is in the system which has formed the veterans of her Army. They have done work which few other soldiers could have done under the circumstances. They have set themselves thoroughly to do their duty to their country. They are by degrees indoctrinating the whole of the Service with the stern, fixed principle of the northern military spirit. Those who have been their companions in camp and garrison will know how to value these gallant men. For readiness, for steadiness, for good conduct, the troops are to be most highly commended, even in such a difficult capital as Rome. Orderly and quiet, with the best qualities of the unspoiled soldier, they have learned that the profession of arms is an honourable one; and that though it may be difficult to maintain it in its integrity, and though the pains and troubles that wait upon it sometimes appear excessive, yet the Italians, who had little thought twenty years ago of what the merit and honour of the military service was, have now been converted into an army and a country of constitutional soldiers.

Let me now show to the ladies present how noble a share their sisters of Italy took in the war of liberation.

I read a poem of Mrs. Browning's entitled:—

"A COURT LADY."

"Her hair was tawny with gold, her eyes with purple were dark,
 Her cheeks pale opal burned with a red and restless spark.
 Never was lady of Milan nobler in name, and in race;
 Never was lady of Italy fairer to see in the face.
 Never was lady on earth more true as woman and wife;
 Larger in judgment and instinct, prouder in manners and life.
 She stood in the early morning, and said to her maidens, 'Bring
 'That silken robe made ready to wear at the Court of the King.
 'Bring me the clasps of diamond, lucid, clear of the mote,
 'Clasp me the large at the waist, and clasp me the small at the throat.
 'Diamonds to fasten the hair, and diamonds to fasten the sleeves,
 'Laces to drop from their rays like a powder of snow from the eaves.'
 Gorgeous she entered, the sunlight which gather'd her up in a flame,
 While straight in her open carriage, she to the Hospital came.
 In she went at the door, and gazing from end to end;
 'Many and low are the pallets, but each is the place of a friend.'
 Up she pass'd through the wards, and stood at a young man's bed,
 Bloody the band on his brow, and livid the droop of his head.
 'Art thou a Lombard, my brother? Happy art thou,' she cried,
 And smil'd like Italy on him; he dreamed in her face and died.
 Pale with his passing soul, she went on still to a second;
 He was a grave hard man, whose years by dungeons were reckoned.
 Wounds in his body were sore, wounds in his life were sorer;
 'Art thou a Romagnole?' Her eyes drove lightnings before her.
 'Austrian and Priest had joined to double and tighten the cord,
 'Able to bind thee, O strong one—free by the stroke of a sword.'

Down she stooped to a pallet where lay a face like a girl's,
 Young and pathetic with dying—a deep black hole in the curls.
 'Art thou from Tuscany, brother? and seest thou dreaming in pain;
 'Thy mother stand in the piazza, searching the list of the slain.
 Kind as a mother herself, she touched his cheek with her hands,
 'Blessed is she who has borne thee, although she should weep as she stands.'

On she passed to a Frenchman, his arm carried off by a ball ;
 Kneeling ' O more than my brother ! how shall I thank thee for all ?
 ' Each of the heroes around us has fought for his land and line,
 ' But thou hast fought for a stranger, in hate of a wrong not thine,
 ' Happy are all free peoples too strong to be dispossessed,
 ' But blessed are those among nations who dare to be strong for the rest.'
 Ever she passed on her way, and came to a couch where pined
 One with a face from Venetia, white with a hope out of mind ;
 Long she stood and gazed, and twice she tried at the name,
 But two great crystal tears were all that faltered and came.
 Only a tear for Venice ? she turned as in passion and loss,
 And stooped to his forehead, and kissed it, as if she were kissing the cross.
 Faint with that strain of heart, she moved on then to another,
 Stern and strong in his death—' And dost thou suffer, my brother ?'
 Holding his hands in hers—' Out of the Piedmont lion,
 ' Cometh the sweetness of freedom ! sweetest to live, or to die on.'
 Holding his cold rough hands, ' Well, oh well, have ye done
 ' In noble, noble Piedmont, who would not be noble alone.'
 Back he fell while she spoke, she rose to her feet with a spring,
 ' That was a Piedmontese ! and this is the Court of the King.'

To H.R.H. Prince Humbert the respectful thanks of the British Officers present at Rome are eminently and in the first place due.

And I avail myself of this opportunity to express our sense of the constant courtesy shown to us by Lieut.-General Ricotti, then Minister of War ; by Lieut.-General Cosenz, Commanding Military Division ; and by the Staff and Officers in garrison at Rome.

OCCASIONAL PAPERS, NOTES, AND NOTICES OF BOOKS.

RECENT REFORMS IN THE RUSSIAN ARMY.

By Captain F. C. H. CLARKE, R.A., D.A.Q.M.G.

IN the following pages it is proposed to present to the reader a short outline of the chief reforms which have been introduced of late years into the Russian Army, more especially during the last two years, 1874-1875: an epoch which cannot fail to be characterised in the future as one of great military activity, not only for Russia, but generally for the whole continent of Europe.

The reform which first attracts our attention is, naturally, that fundamental one which affects the whole fabric of the commonwealth: the introduction of general obligatory service for all classes of the community. Its main object, as is also the case with the other reforms, is to increase the numerical strength of the army.

The great development of the armed forces of the European Powers during and after the war of 1870, had caused Russia to recede into the background when estimated from a numerical point of view, whereas eight years previously she had held the foremost place in this respect among her immediate neighbours. Thus, in 1862, Prussia had an army of 775,000 men, Austria of 700,000, and Russia of 1,300,000 men. In 1870, Germany had increased her effective to 1,310,000 men, Austria to 1,000,000, while the forces of Russia had undergone no augmentation. This was considered an unsatisfactory position for the nation, and a commission was appointed to consider the whole question of recruitment and reserves. After mature deliberation, extending over a period of two years, during which the subject was ventilated from every point of view, and the opinions and interests of all classes were consulted and weighed, the commission ultimately submitted, for the approval of the Emperor, the project of a new law for regulating military service. This project, after being altered somewhat in its details, but not in its general principles, by the Emperor's immediate advisers, became law on the 1st January, 1874.

Although the introduction of general obligatory service must be regarded as the first radical reform to which the army has been subjected of late years, it would be incorrect to suppose that it broke suddenly upon a *régime* existing from the time of the Crimean war, and that the experience of that campaign had been lost upon the nation. On the contrary, immediately after the peace of Paris, we

find the Russians examining their military system and remedying the more prominent shortcomings and defects under which it was labouring. But the hand using the pruning-knife, instead of proceeding to the root, touched only the more prominent excrescences on the branches. The ground for any fundamental change was not yet ready.

The path of progress in army-reform was so hampered by conflicting interests that no changes of a radical character were possible, until the impediments which beset it could be removed. At length the day dawned when the onward progress was to be freed from the trammels restraining it. The emancipation of the serfs by the present Emperor in 1861, cleared the way for reform in the military system, as it did for those numerous other amendments in the constitution, which, in process of time, if as steadily followed as commenced, will serve to raise Russia to the level of other European nations.

So long as the serfs constituted the great source from which recruits for the army were derived, any augmentation of the yearly contingent, with a view to passing a greater number of men through the ranks into the reserve, was so very unwelcome a measure to the proprietors as to be well nigh impossible. In order to avoid interfering with the rights of the latter, so time-honoured as almost to be sacred, the Government was obliged to forego any increase to the reserve, and as compensation, to retain the men present with the colours as long as possible. Another evil was that the ranks became the receptacle of all the dross of the community, the proprietors and communes being openly invited to make use of this means for relieving themselves of their bad characters. Service in the army, instead of being regarded in the light of an honourable duty, became a reproach and was looked upon as a stroke of misfortune not less intolerable than deportation to Siberia. So repugnant to men of self-respect was the profession of arms, that the Government was forced to allow every possible outlet for escaping service. Not only were exemptions accorded to those with rights appertaining to birth, to those exercising useful professions, and to those possessing certain educational qualifications, but also to those who had sufficient means to purchase membership of a guild. Failing the foregoing qualifications, any person drawn for the army could purchase exemption, or provide a substitute to take his place in the ranks.

Exemptions in the regular army had increased to such an extent by the year 1873, that of a male population of thirty millions in European Russia, exclusive of Poland and Finland, only about twenty-four millions were liable to military service. And if we further deduct from that number those who purchased exemption, it will be found that about one-fourth of the population was free from service in the army.

Again the system adopted in levying the contingent of recruits opened the door to many abuses. It was entirely in the hands of the communal authorities, and, as might be expected in a comparatively rude state of society, the latter were not inaccessible to influence in making up the

contingent of recruits. The communes had also to provide certain articles of clothing, food for three months, and pay for the recruits.

Consequently, the burthen of military service fell with its entire weight upon the citizen who was too poor to purchase exemption, and upon the serf class, while the expenses of furnishing and equipping the contingent formed a heavy charge on the commune funds.

The year succeeding the emancipation of the serfs was marked by the commencement of some important army reforms, which, however inceptive and incomplete in their character, must be looked upon as strides in the right direction. These reforms were the following; the various units of troops were to be increased to such an extent, that, with a small establishment in time of peace, they would provide sufficient cadres for the army whenever the time should come to raise it to the war footing; the men requisite for augmenting the army to the war establishment were to be sent on furlough, ready to be called up if required. Certain changes were introduced with a view to the more efficient training of recruits, the local troops were re-organised and the number of non-combatants was considerably reduced.

But scarcely had these changes time to bear fruit when the two great wars of 1866 and 1870, sudden in their outbreak, and rapid in their course and result, shewed that victory attaches itself to that army, which, in time of peace, has the different parts of its complex machinery so perfect and arranged, that it can be set in motion in any direction without friction or delay; and, when set in motion, is able to strike a blow of superior weight, and has the means for sustaining its continuous action.

In order to understand how far from satisfying these requirements was the Russian Army of the time of the Franco-German War, and to appreciate the reforms since introduced for its amelioration, we must further glance at the general principles of the organization which obtained previously to the recent changes.

The Russian Army consisted then, as now, of the regular army, the irregular troops, and the militia.

The yearly contingent of recruits for the regular army was divided into field and local troops; the former were intended for operations in the field, the latter for home defence, training recruits, defence of fortresses, and the performance of local duties in general.

The irregular troops consisted of the Cossack contingents, and the militia of the Caucasus and Trans-Caucasus. The service of these troops was subject to special provisions.

The militia, analogous to the German landsturm, could only be called out under special circumstances of danger threatening the mother country.

Up to the spring of 1874 the regular army was recruited from those liable to service and by volunteers. Those coming under the first classification were such as paid a capitation or equivalent tax, former crown, or appanage peasants and original serfs. The nobility, merchants, parish authorities, colonists with certain privileges, inhabitants of certain districts, and many others were exempt. The intellectual class of the community, therefore, was not represented in the army.

Recruits were not to be less than twenty-one nor more than thirty years of age. It by no means followed that a man passed over at one of the levies would not be drawn in some subsequent year. He could not, therefore, feel himself free to enter upon other pursuits until he had passed the limit of age. The duration of service was twenty years for those enlisted prior to September, 1859, and fifteen years for those entering the Army subsequent to that date. After thirteen years, those under the former rule could be granted indefinite furlough, and those under the latter, after ten years. Lastly, the authorities had the power to send men of good character on furlough after eight years' service, provided the effective was above its normal strength. Men on furlough, whether for an indefinite or for a fixed period, were included in the reserve, and could be called up to serve if required.

Volunteering for the army, for periods of fifteen, ten, or even five years, was open to every Russian subject.

From the foregoing brief sketch it will have been seen of what faulty elements the Russian Army had been composed previous to the introduction of the new law, and how unequally the burthen of military service weighed upon the population. Let us now see what important changes the new law has inaugurated.

New Law regulating obligatory Military Service (January, 1874).

The main features are, that the enrolment of criminals and of persons of ill-repute has been abolished; the term of service has been reduced to fifteen years, of which six years are passed in the active army, and nine years in the reserve; the number of exemptions has been curtailed as much as possible; many impediments and conditions have been set aside in the admission of recruits; the system of paying money to provide a substitute is no longer permitted.

These reforms, trenchant as they were in curtailing the freedom of a section of society, which up to that time had looked upon immunity from military service as its prerogative, were accepted generally in a cheerful spirit throughout the empire. This circumstance must be the more satisfactory to the Emperor and his advisers, as the feeling of the people in favour of the change was not born of disaster as are so many radical reforms, but was the offspring of serious meditation in time of peace.

The new law divides the armed forces into *active army*, in which the period of service in European Russia is six years,¹ the *reserve*, to which men who have passed through the army, belong for the next nine years,² and the *militia* or general levy, in which all are included

¹ Although the term of service in the active army in European Russia is six years, the War Minister has the power to grant furloughs to men before the expiration of that period. Furloughs, not exceeding a year, may also be allowed at any time during the term of service.

In Turkestan and Asia the term of service is seven years in the active army, and three years in the reserve.

² During his nine years' service in the reserve a man is on permanent furlough, is placed under the civil law, and may pursue any calling or occupation. He is liable, however, to be called out twice for drill during these nine years, each time for six weeks.

who are capable of bearing arms, from the age at which they are liable to service to the completion of their fortieth year. This law is applicable to the whole empire and to Poland, but not to Finland.

The number of men necessary to complete the army is decided each year by law. The distribution of the yearly contingent among the Governments and districts is made by the War Ministry proportionately to the number of persons in each who are liable to service. A more detailed distribution is afterwards drawn up by the Government and district commanders. The actual levy, the lot-drawing and examination of the conscripts devolves upon the Circle Commissions. Those persons liable to be drawn are such as have completed their twentieth year in that year in which the levy takes place.

Besides, the men entering the army by lot-drawing, every Russian has the right to enlist as a volunteer, under certain conditions as to age, state of health, and educational qualifications. The degree of the latter determines his period of service, whether for three, six, or twenty-four months, at the expiration of which the enlisted volunteer passes to the reserve for nine years. Volunteers are allowed, as a rule, to select the regiment in which they are desirous of serving. Those entering the Guard must maintain themselves at their own cost, others may be allowed to do the same and to live in private quarters. All enter as privates, and, according to their educational qualifications, may be promoted to the grade of non-commissioned Officer after two, four, or twelve months' service, and to that of Officer after three, six, and thirty-six months' service in the non-commissioned ranks. No commission can, however, be conferred unless the applicant has served in camp during one period of exercise.

There is also another class of volunteer soldier called "amateur," who serves under analogous conditions to the three-years' volunteer of the German Army. This class is composed exclusively of men not liable to military service, and those belonging to the militia, provided they do not exceed thirty years of age. Their period of active and reserve service in peace is precisely similar to that for ordinary recruits. In time of war they are obliged to serve so long as it lasts, but are not afterwards included in the reserve except of their own choice.

The militia consists of all men not forming part of the standing army who are capable of bearing arms, and whose ages are between twenty and forty years inclusive. It also comprises all men released from the reserve. The men belonging to the militia are divided into two categories; the first consists of the four youngest classes, and is intended to form either distinct regiments of militia or to augment the ranks of the standing army in the event of the reserve being insufficient; the second category includes all the remaining classes, and is solely used for forming a distinct militia force.

The shortening of the term of service introduced by the new law, and the obligation for all classes to serve, will place in the course of a few years a very large force of trained reserves at the disposal of the Government. In fact, so vast are the resources of the empire, some 700,000 men annually attaining the age of liability, that it would be possible and may appear advisable to shorten the period of service, by

which a still larger number of men will be passed through the ranks into the reserve. Let us explain by figures. The present peace establishment of the regular troops in European Russia is 760,000 men, to maintain which an annual contingent of 140,000 recruits would approximately be necessary. The actual number to be levied has been raised this year to 180,000, and even with this large contingent about three-fourths of those liable escape military service.

A comparison of the relative proportion of those levied to those liable in other countries, where conscription is in force, will show that the burdens of military service press least heavily in Russia. In fact, advantage is taken of the circumstance that there is so large an excess of available *personnel* to soften the measure of universal liability by granting postponements of entry, and numerous exemptions altogether from service when the grounds are good and sufficient. No other State accords such privileges to education. Not only is the term of service abridged for young men of culture who enter as volunteers, but for those also who take part in the lot-drawing. Even the most elementary instruction, that of the primary schools, confers the right of a reduction of two years (four instead of six) in the active service.

Again the exemptions on family grounds are most numerous. In other countries, these privileges are only granted, as a rule, to those who are the means of support of necessitous families; for an only son to obtain exemption, his parents must not only be sixty years of age, but must also have no means of existence. In Russia, the age of the parents is fixed at fifty-five; and not merely is the only son of aged parents exempt from service, but also the son of parents capable of looking after themselves.

Lastly, with respect to property, the law allows of postponement in the case of those persons whose presence at home is urgently demanded by their private affairs, whether such business be connected with landed property, commerce, or trade. In order not to throw any impediment in the way of exercising such professions as are necessary and useful to the State, exemptions and postponements are allowed in favour of the clergy of all Christian denominations, doctors, pharmacutists, veterinary surgeons, artists, professors, tutors, captains of the mercantile marine, pilots, their apprentices, and others.

With regard to the rights accorded to soldiers, those in active service retain all their rights, personal or other, are exempt from all personal tax, and after discharge to the reserve, may proceed where they will. During their first year of reserve service, they are also free from taxes.

The military law of 1st January, 1874, affects only the standing army, the reserve, and the militia. In addition to these there exist the different Cossack contingents and some native irregulars, which are provided for by regulations of later date. The Cossacks retain their former institutions, which make every man a soldier and a colonist at the same time; the native population of the Caucasus and Siberia is expressly exempt from the new law, special regulations having been issued for these various tribes.

We will now proceed to mention the changes which have taken place in the organisation of the regular troops.

Army of the Caucasus.

The regiments of all the Infantry Divisions in the Caucasus military district have been increased by an additional battalion. Each regiment now consists of four battalions, of which three are line and the fourth a rifle battalion; each battalion consists of four companies. At the same time, in lieu of the four establishments¹ previously existing, only two are maintained: the *peace establishment*, of 24 files per division (half company), and the *war establishment*, of 54 files. In consequence of this arrangement, a battalion of a regiment on the war-establishment has very nearly the same strength as heretofore, because although the number of companies is diminished by one, the number of men in the company is increased by some fifty (54, instead of 42 files per division). In the general result, therefore, a Division on the new establishment has sixteen battalions instead of twelve.

The number of Infantry Divisions has been increased from six to seven by the addition of the 41st Infantry Division.² The 41st field artillery brigade, of six batteries, has also been newly created.

The nucleus for the formation of the 41st Division was given by the already existing fourth battalions of the Grenadier, 19th, 20th, and 21st Divisions; the remainder of the men were newly raised. The fourth battalions, given up by the Grenadier, 19th, 20th, and 21st Infantry Divisions, for the aforesaid purpose, were replaced by the men from the supernumerary fifth companies. To form the fourth battalions of the regiments of the 38th and 39th Infantry Divisions, were employed 6 line, 1 local, and 1 fortress battalion.

The general scope of the re-organization of the army of the Caucasus has been to augment the infantry of the field-army by 28 battalions, or in round numbers, by 280,000 men.

Abolition of the Cadre Establishment of Infantry throughout Empire.

All the regiments of those Infantry Divisions which were on the cadre establishment have had their effective raised from 16 files per division (half company) to 24 files, *i.e.*, to the ordinary peace establishment. This measure, while augmenting in a large degree the effective, and, in consequence, enhancing the state of preparedness for war, removed many disadvantages arising from the small numerical effective of troops on the cadre establishment.

There were 22 Infantry Divisions on the cadre establishment. By giving these Divisions an increase of 8 files per division (half company), the result has been to augment the army by about 43,000 men in time of peace.

¹ War, increased peace, peace and cadre establishments.

² The infantry of the Caucasus now consists of the Grenadier, the 19th, 20th, 21st, 38th, 39th, and 41st Infantry Divisions.

Re-organization of the Cavalry.

The seven Cavalry Divisions of the line¹ previously existing have been split into halves, and formed into fourteen Divisions, to each of which has been added a regiment of Cossacks of the Don. Thus, each Cavalry Division of the line, formed in two brigades, now consists of four regiments; one of dragoons, one of lancers, another of hussars, and the fourth of Cossacks, all bearing the same number as the Division to which they belong.

All regiments of cavalry are to have the full war establishment in time of peace, that is to say, 16 files per division (quarter-squadron).

In addition to the above, a separate Cossack Division has been formed of four regiments of Cossacks of the Don, also divided into two brigades.

Thus after the transformation, instead of ten Divisions of cavalry (including the Guard), as heretofore, there are eighteen, of which two belong to the Guard, one Caucasian Division of dragoons, fourteen Divisions of the line, and one Division of Don Cossacks.

In time of war, it is further proposed to form three Divisions of cavalry of the Guard, and to split up the Caucasian Division into two, adding to both regiments of Cossacks. In this way the total number of Cavalry Divisions will be twenty.

Re-organization of the Horse Artillery.

This measure, rendered necessary by the new organization of the cavalry, consisted in augmenting the number of regular batteries of horse artillery from 18 to 26, but at the same time reducing the number of guns in a battery from 8 to 6. The number of Don Cossack batteries was also increased from 16 to 22, of which number 8 are permanently maintained in time of peace. This arrangement allows of each Cavalry Division being assigned two batteries of horse artillery.

Five regular batteries and one irregular (Don Cossack) battery of the Guard form the horse artillery brigade of the Guard, which is attached to the 1st and 2nd Guard Cavalry Divisions. The other batteries of horse artillery, not formed into brigades, are attached to the fourteen Cavalry Divisions of the line as follows: 2 regular batteries to the first 7 Divisions, and 1 regular and 1 irregular battery to the remaining 7 Divisions.

Changes in the Field Artillery.

The 41st Brigade has been newly created.

The greater proportion (44) of the brigades of field artillery stationed in European Russia now consist of three 9-pounder, two 4-pounder, and one mitrailleuse battery. The remaining four brigades have a mountain battery in lieu of the battery of mitrailleuses.

¹ Each Division consisted of six regiments of cavalry, viz., two dragoon, two lancer, and two hussar regiments.

Seven of the brigades are on the increased peace establishment, the remaining forty-one on the ordinary peace establishment.¹

The war establishment of the artillery in European Russia, will, therefore, consist of 48 brigades of field artillery, with 288 batteries, or 2,304 guns, 26 batteries of regular and 22 batteries of irregular horse artillery, with 288 guns. Total 2,592 guns.

Reorganization of the Local and Fortress Troops.

The organization of the local troops has been completely modified, the first step to this being the final abolition (commenced in 1870) of the so-called reserve troops, upon which devolved formerly the training of the recruits. The recruits are now trained with the field troops.

The reorganization of the local and fortress troops, in conjunction with the issue of regulations for the formation in time of war of *reserve* and *dépôt* troops, forms part of the great scheme of army reform, and is intended to relieve the field or active army from all secondary operations in time of war. The *reserve* troops, now so-called, furnish the men necessary to complete the army to the war establishment on mobilization. The local troops in time of war will perform all the home duties, and if necessary, supply men to form *dépôt* and reserve battalions.

This reorganization has now been carried into effect. The local troops are now divided into two categories:—(1) local battalions and local detachments, of the same establishment in peace as in war, and (2) local battalions and local detachments, with a cadre establishment. The distinction is merely a matter of convenience. When there are regular troops stationed in the same garrison with local troops, the latter do not require so large an effective as in garrisons where they have to perform all the local duties.

Local battalions on the full effective vary in strength from 600 to 1,000 men, according to the extent of the duties in the garrison where they are quartered. Local battalions on the cadre establishment (400 men) are transformed in time of war into regiments of four battalions.

Local detachments on the full effective consist of 250 men. Those on the cadre establishment, varying in strength from 64 to 250 men, are transformed in time of war into battalions of 400 to 800 men.

The organization of the fortress infantry is also *en train*. In time of peace the fortress infantry consists of separate battalions, each of 4 companies, and each division (half-company) of 24 files. But in time of war the battalions are broken up, each company being then converted into a battalion of 4 companies, of 54 files per division. Thus each battalion will be transformed into a regiment of 4 battalions, each of 900 men.

The number of fortress battalions is given as 29 in time of peace. In time of war this number would give 116 battalions, or about

¹ On the increased peace establishment all eight guns are horsed, on the ordinary peace establishment only four.

120,000 men. These may be combined into Brigades and Divisions if necessary.

Such a large augmentation in the numbers of the fortress infantry on mobilization—more than eight times the peace effective—demands very large reserves both of men and material, and can only be carried into effect gradually. According to a recent order, measures have been adopted for getting the material in readiness for forming at first, in the event of mobilization, each fortress battalion into a fortress regiment of two battalions.

Organization of the Reserve and Dépôt Troops.

By the issue of the regulations for the *reserve* and *dépôt* troops, entirely new classes of troops have come into existence in the Russian Army. The former are intended for secondary military operations and for duties on the communications of an army, while the latter are charged with the timely preparation, training, and despatch to the theatre of war of the reinforcements necessary to replace casualties among the field and reserve troops of all arms. As their designation indicates, these two categories of troops are only formed in time of war.¹

Each regiment of infantry and each rifle brigade (except those in Turkestan) is to have a *dépôt* battalion; consequently, in all, there will be 12 guard, 16 grenadier, and 164 infantry *dépôt* battalions, besides 1 guard and 6 rifle *dépôt* battalions. These *dépôt* battalions, however, do not appear to be in close connection with the field troops as is the case in Prussia, where each corps gives up on mobilization a portion of its effective to form the *dépôt* (*Ersatz*) troops.

The organization of the *dépôt* battalions of the guard, grenadiers, rifles and infantry of the line is identical. Each *dépôt* battalion has four companies, and consists of a *cadre* and a *variable establishment*; the former includes the training staff, the latter furnishes the escorts for the convoys of reinforcements for the field troops, as well as the reinforcements themselves. There are no cadres in time of peace, but, on the outbreak of hostilities, the battalion is formed partly of officers, non-commissioned officers, and men from the nearest field and local troops and partly of reservists and militia of the 1st class. In order to accelerate mobilization the battalions are formed by companies, as far as possible at points selected for their central position with regard to the rayon of recruitment, and also with reference to convenience of communication. The clothing, arms, and equipments are stored in time of peace at these company centres, from whence, fully equipped, the companies proceed to the head-quarters of the *dépôt* battalion.

The total number of *dépôt* battalions—199—will give a force of about 260,000 officers and men, of whom 220,000 will be immediately available to replace casualties.

With regard to the *reserve troops*, this new creation is analogous to the Landwehr troops of Prussia; they are intended to reinforce or

¹ Except the cadres of the *dépôt* troops for the special arms, which are also maintained in time of peace.

replace the active troops on the theatre of war. There are no permanent cadres in time of peace, but, on the declaration of war, the reserve battalions are formed, partly of officers and men from the field or local troops and partly of reservists. Their organisation is precisely similar to that of the active troops; complete stores of clothing, equipment, &c., are maintained in time of peace. For the present, until there are sufficient reserves at disposal for forming the 164 battalions contemplated, the number of reserve battalions will depend upon the reservists available after the active and dépôt battalions have been completed to their war establishment. The reserve battalions will be combined, if necessary, into Brigades and Divisions.

When the whole number of reserve battalions is formed, the number of troops in this category would be upwards of 180,000 men.

Changes in the Conditions of Service of the Don Cossacks.

We now come to the changes in the organisation of the irregular troops. The new regulations differ for the separate Cossack contingents. As a type we will take the Cossacks of the Don as being the most numerous and as being the force which it has been decided to employ in European fields of warfare.

According to the regulations previously in force, the regiments of Cossacks of the Don had no permanent organization. On the outbreak of hostilities, regiments were formed of the men in the military district, while the officers and non-commissioned officers were appointed from the whole contingent. Thus the regiments were a mass of men without any intimate cohesion. On the termination of the campaign, the men were dismissed to their homes, and every trace of the regiment disappeared. This system prevented the formation of the administrative and other services, and at the same time militated against all *esprit de corps*. The greatest defects would appear at mobilisation, which would be exceedingly slow, and would not correspond to the requirements of the time, when it is proposed to make use of these troops at the outset of the campaign.

The new regulations for the service of the Don Cossacks, which came into force on the 1st of January, 1875, took into account, on the one hand the new organization of the armed forces of the empire, and, on the other, the defects which experience had shown to exist in the previous constitution of the Cossack contingents. The Cossack force thenceforward received a permanent organization, which guaranteed a rapid mobilization in time of war, and permitted of the Don Cossack regiments being embodied in the Cavalry Divisions.

By the terms of the new regulations, the Don Contingent consists of the active troops and the militia. The latter is only called to arms under exceptional circumstances. The active class is divided into three categories: (1) The *preparatory*, (2) the *field*, and (3) the *reserve*. The *preparatory class* includes all young Cossacks between the ages of 18 and 21. During their first year in this class they perform no military duty, but are merely required to provide them-

selves with the necessary equipment. Their training does not begin until the autumn of the second year at their respective *stanitsas*,¹ and is continued through the third year. After three years passed in this category, the Cossacks pass to the *field class* for twelve years. From this class are drawn the men required for completing the detachments maintained in time of peace, and for filling up the entire contingent placed in the field in time of war. In time of peace, the actual period of service is never more than four years, and, as a general rule, will not exceed three, after which the Cossack will not be liable to be called up except for manœuvres or for war. For the remaining eight years of the service in the field class, the Cossack is granted furlough. After completing his full period in the field class, he passes into the *reserve class* for five years, during which time he is entirely free from service in time of peace, but in time of war would be liable to be called up to replace casualties.

From the year 1868 until the issue of the present regulations the term of service of Cossacks in the field category, that is to say, the time during which they were liable to be called up for service was 15 years, commencing with their 20th year. In addition to this, they were liable to *interior* service for 7 years. By the new law, the Cossack in time of peace would be free from military service after completing his 24th year at the latest.

According to the new regulations, the Don Cossack Contingent is bound to furnish, in time of war, 62 regiments of cavalry (including 2 Guard) and 22 batteries of horse artillery. Of this force, the following are to be maintained in time of peace:—The Body Guard Cossack regiment, 20 regiments of the line, 1 guard battery, and 7 line batteries of horse artillery. The line Cossack regiments consist of 6 sotnias, of 14 files per division (quarter squadron).

The Don Cossack territory is divided into five districts, and, as far as possible, each district furnishes the recruits for its respective regiments. For the artillery, the territory is divided into two sections. The distribution of the quatum of recruits among the districts is in the hands of the Ataman.

The 60 regiments are divided into 3 divisions of 20 regiments each; the first division is on duty in time of peace, the other two are on furlough. The men in the first division, after serving their time, are replaced by young Cossacks; those belonging to the second division have to keep their horses and equipment always available for instant service, those of the third division only their equipment.

As regards the horse artillery, the men belonging to those batteries which are to be mobilized in time of war are bound to have their equipment, clothing, arms, and riding horses in constant readiness. The guns, carriages, waggons, &c., are all kept in store ready for issue when required.

A proportion of Cossack troops are trained in railway duties by being attached for 2 years to certain lines of rail.

When the new regulations come to maturity, the Don Cossacks

¹ Cossack village.

will contribute to the active army a force of upwards of 50,000 completely equipped cavalry and 22 horse artillery batteries, with 132 guns. Besides these, to replace casualties, there will be a reserve of 20,000 to 25,000 men, the oldest class of the *preparatory* category, 5,000 to 7,000 men, and the militia, consisting of 25,000 to 30,000 Cossacks.

Formation of the Crimean and Bashkir Divisions.

The object of these new formations is to have a small permanent establishment for training recruits, the Crimean division for the Tartars of the Crimea, the Bashkir division for the Bashkirs (Tartars) who live within the jurisdiction of the Orenburg Government.

At first only squadrons were formed, but the contingent was afterwards increased to a division of two squadrons.

The Bashkirs had at one time a regular force, which was afterwards disbanded. By the present arrangement, instead of being subject to the new military law, they satisfy their obligation to military service by forming a separate contingent, very much in the same way as the Cossacks. They provide their own horses and equipments.

Additional Formations in Turkestan.

In consequence of the recent operations undertaken against Kokan, and the resistance which was experienced, it has been found necessary to form two new line battalions of infantry and a battery of artillery in the Turkestan military district.

We now come to the more important reforms which have taken place in the administrative branches of the army.

Reforms in the Administrative Branches.

The change of the greatest moment is the reorganisation of the local military administration in the Governments and Circles (*Vyezds*),¹ viz., those local authorities charged with the recruitment of the army in time of peace, the accounts and control of the recruits, and more especially, the mobilisation of the army in time of war.

The control of the reservists in time of peace devolved formerly upon administrative authorities of two instances. The highest instance for each Government was the bureau of the military chiefs of Governments, the lower instance, for each town or Circle, was the town and Circle police administrations. The control of the first instance was merely nominal. The real work fell upon the shoulders of the authorities of the lower instance, consequently upon civil administrations which were already overburdened with their own business, and therefore inclined to look upon the duties connected with the reservists as of secondary importance. The military chiefs of Governments kept up registers of the reservists based on the information furnished by the police, but without any knowledge how far the information thus supplied was in agreement with the true position of

¹ In Russia the empire is divided for administration purposes into Governments, and these into *Vyezds*, or Circles.

affairs. At the same time, when the number of reservists was comparatively small, there was less necessity for a specially constituted administration, but of late, when the number of men on furlough is said to exceed 700,000, the old arrangement was no longer sufficient. With the introduction of obligatory service, when the number of reservists will, in course of time, be still further augmented, it would have been utterly beyond the power of the old administration to carry out the duties.

Again, all the arrangements for calling out the reservists in the event of mobilisation were too much centralised, being centred in seventy Government administrations. The former military chiefs of Circles formed merely a superfluous channel between the police and Government administrations, and, consequently, rather retarded than accelerated mobilisation.

In the present day a military official has been introduced under the Government Military Commander, as a lower instance, called the Circle Commander, who is the real executive authority in regard to recruitment and the control of the reserves.

The duties of this officer are as follows:—He exercises direct command over the local troops in the garrison where his head-quarters are established and has the general control of all the other local troops within the circle. He is a member of the Circle Recruiting Commission, and as such is personally responsible for the selection of the recruits for the various arms. The duty of keeping the registers of the reservists and of the militia of the 1st class, as well as of the reserve officers and men intended to be assigned to form the cadres of the reserve and dépôt battalions devolves upon him. On the basis of the lists furnished by the general staff he apportions the reservists to the troops and prepares beforehand their joining orders, so that no time may be lost on the mobilisation of the army. He is responsible for the stores at the dépôts being provided with the clothing, equipment, &c., necessary for the reserve and dépôt battalions to be formed in his Circle. It is his duty also to collect such information and statistical data as bear upon a rapid mobilization in the Circle, so far as they affect the distribution, supply the roads of communication, and the means of transport. In time of war he calls up the reservists to the colours, dispatches them to the field army and fills up the local troops under his command. He forms the reserve and dépôt companies and issues orders for them to join their respective battalions. He makes arrangements for transport of the sick and wounded, and for putting in execution, within the Circle, the law with regard to the compulsory supply of horses on mobilization.

Whilst the Circle Commander is the executive authority, the Government Commander exercises general supervision over the Circle Commanders. Superior to him again is the Commander of the Local Troops of the Military District.

This augmentation of the administrative authorities who have the important duties of controlling a number of men, who after passing through the the Army are living in the mass of the population, and have to make such arrangements as will ensure their timely assembly

on the receipt of the orders for mobilization, is of great moment. In a vast empire like Russia, it would have been impossible to do this effectively with the seventy Government administrations, the Governments often embracing an area of hundreds of square miles. The distribution of work requires to be on a much larger scale. Hence the introduction of the Circle Commander as the executive authority.

It seems that even this distribution is hardly sufficient, and that it requires still greater extension. For instance, in North Germany, the same duties devolve upon 70 commanders of brigade districts, 296 commanders of landwehr battalion districts and 1,300 company district sergeants-major. The Russian circle commander corresponds to the commander of the landwehr battalion district in Prussia, so that the further link of the company district serjeant-major is wanting in the former country—and we know the value attached by the Germans to these officials in the control of the reservists in time of peace. It appears to us, that within certain limits, the more this nature of work is divided, the more effective the control over the reservists in time of peace, and the more speedy the mobilisation in time of war.

Another important reform was the issue of the regulations for the formation of army corps.

Formation of Army Corps.

Up to recent times the Division of infantry has been the largest unit of troops, one or more Divisions being quartered in each military district. In addition to the Divisions of infantry, there were Cavalry Divisions and Brigades of artillery in each district, but there was no intimate grouping of the different arms such as we understand by the army corps, which consists of a due proportion of the three arms accustomed to work together.

The question of the formation of army corps was discussed as long back as 1870, by the commission appointed to consider the re-organization of the army, but the opinions were so divided that no conclusion was arrived at, and the question was left for the final decision of a special commission. The result of their labours was to recommend the partial introduction among the regular troops of army corps, regulations for which were confirmed by the Emperor in August, 1874.

In these regulations it is laid down that in those military districts in which the troops are to be grouped in army corps, the officer in chief command of the troops in the district has the right of inspecting the corps personally or through the chief of his staff. It is also his province to see that the service duties are carried on in a proper manner, that the troops are well and duly supplied, and that all the material required on mobilization is held in constant readiness for use. In those districts where the formation by army corps does not obtain, the duties ordinarily devolving upon corps commanders fall upon the officer in chief command of the troops in the military district.

The duties of the corps commander comprise the command of the *personnel* and the military training of the Corps. He is under the

immediate orders of the officer commanding the troops in the military district. Upon him devolves the duty of deciding as to the manœuvres of the year, and exercising general control over them, determining what troops are to be encamped and so forth. He makes an annual inspection of the troops at the time he thinks fit to appoint, rendering to the officer commanding the district a report of their state and more especially with regard to those matters which affect mobilization, for the rapidity of which in time of war he is personally responsible.

Up to the present time the administration by army corps has only been applied to the Guard Corps, which has been formed under the command of His Imperial Highness the Tsarevitch.

From the preceding brief sketch of the various reforms which have been introduced in the military system of Russia, it will have been seen that the chief objects sought to be attained are a sufficient reserve of men on furlough to fill up the peace cadres, an intimate connection between these men and the regiments they are designed to complete, and the adoption of such arrangements as will tend to their rapid assembly round the standards, in other words the mobilisation of the army for war.

No nation which respects its independence, be its geographical situation what it may, but must attentively consider these matters beforehand in peace, and work out and mature the scheme of mobilisation best suited to its peculiar requirements, no matter at what cost. The sound of the war-tocsin—the day of the declaration of hostilities—is no time for considering in what way the various units shall be grouped, but must merely be the signal for setting in motion those agencies, carefully pre-considered and rehearsed in time of peace, by which the army is placed in the field as a perfect weapon for offence.

HUGO HELVIG'S TACTICAL EXAMPLES.¹

I.

THE late campaign in France has caused a very curious change in the general impression concerning German intellect. Formerly, they were considered to be a slow and plodding people; now men speak with respect of their dash in war, and argue that such brilliant strategists, tacticians, and leaders of troops, cannot be deficient in brightness of intellect. A little examination of the subject, however, soon shows that the facts are as were first supposed, only the inferences drawn were erroneous. We may look through the whole war in vain for examples of the inspiration plainly displayed by Napoleon I. In 1870 was shown the power, not of genius, but of sober systematic organisation and training joined to a stern discipline. The only brilliant idea struck out of German solidity of character was the pamphlet written after 1866, and attributed to Prince Frederick Charles, in which the author pointed out that to be successful against the French it would be necessary to meet them with their own tactics, not to wait for their rush, but to attack boldly. Yet even this idea, fertile in success as it turned out to be, may have been elaborately thought out. Who knows how many months the author may have pondered, how many hours he may have spent with his leaden battalions and Kriegsspiel maps before the pamphlet was published? Prince Frederick Charles himself once told the present writer that he attributed the great success of the Prussians, even against superior forces and equal bravery of the French, to that admirable system of instruction which enabled generals to trust absolutely in junior officers, knowing that the shortest and simplest orders would be enough for them, and that wherever an officer was present, the troops he led would be handled on certain definite and well understood principles. Though the German drill-book was in its regulations behind the age, the German Officers were able to direct their men to victory while breaking the rules every day and every hour. Since the war, there have been serious controversies little heard of in England. The drill book has been altered, but is still, in the opinion of a large school of tacticians, quite unable to meet the requirements of modern war. The author of *Tactical Examples* writes in the spirit of the new school. He will not allow his book to be considered as an addition to the regulations, though his examples are worked out in conformity with the present

¹ *Tactische Beispiele* von H. v. Helvig (Major) : Mittler, Berlin. 9s.

"*Exemples Tactiques*." Par H. v. Helvig, Major de l'Etat, Major-General Bava-rois, détaché au Grand Etat Major-General Prussien. Traduction de M. le Lieut-Colonel Lectère. Paris, 5s. 6d.

formations. On the contrary, he insists that "it is not *with*, but in spite of the regulations, that *good instruction* and *solid preparation* "for war, as the author understands them, are possible in time of peace." His teaching is based on the venerable principle, "The letter killeth, but the spirit giveth life." True, he could not have worked out these examples in their present form if the drill book had not been altered, but he holds that the regulations alone would not only be insufficient, but positively detrimental. He insists with much truth that there is no formation which will meet all cases, that officers must be trained to act according to circumstances, and that as the necessities of modern fighting inevitably cause more confusion than occurred of old, the highest wisdom now is to practise that very confusion, and the means for extrication from it, rather than to insist on a steadiness in peace manœuvres which must break down in war. Let not the lover of steadiness and discipline start back in surprise and condemn the book unread. Its object is to reduce to a minimum the real confusion in war by familiarising officers and men with the difficult situations likely to arise until confusion is no longer real, but only apparent.

Von Verdy du Vernois, in his "Studies on Troop Leading," gave the world admirable examples of the movements of divisions and brigades under circumstances supposed to be those of war itself. Major Helvig undertakes the more modest, but not less useful, task of working out in detail the manœuvres of smaller bodies, companies, battalions, and at last brigades, under different given conditions; and he recommends strongly that all commanding officers should train their commands by exercising them in the examples he gives, or in others devised by themselves. So anxious is he to imitate closely the difficulties of war, that he even proposes that, at various stages of the fight, leaders of different bodies, battalions, companies, &c., shall be caused to step out of their places as if wounded, and resign the command to subordinates. By such arts as these will he have war simulated, and officers trained in the new tactics now accepted by all the world, so that the praise of Prince Frederick Charles shall still be deserved, and Generals be able to count on the cool action of their juniors, even when all seems to be a mass of confusion.

The first volume contains thirty examples, the highest of which shows only a force of one battalion, two squadrons, and a few guns. The second volume begins with a battalion and a-half, and ends with a brigade of seven battalions, together with three batteries and four squadrons, forming the rear guard of a large body of troops, and ordered to defend the passage of a defile. His method may perhaps be best described by taking one of his simplest examples, and working it out with him. For this purpose nothing can be simpler than one battalion on either side, and we will take Major Helvig's first example. The real student of tactics will not despise even first lessons. We can assure him that he will find further on in the book examples of a much more complicated character.

Our example, then, is the attack of one battalion against another, each consisting of four companies.

The author begins by laying down certain tactical considerations for each example; and the "considerations" with regard to the one we have chosen are that, with equal forces on both sides the enemy should be "contained" in front, whilst the principal attack is directed against one of the flanks. Premature and insufficiently prepared attacks from the enemy are to be repulsed by as rapid a fire as possible, whilst the reserve, held in readiness, endeavours to profit by seizing such moments for counter-attack.

The battalion is advancing in company columns at deploying intervals.

Major Helvig gives the condition of the fight at twelve different phases, which he calls first, second, third, &c., moments. A diagram is given for each moment.

First moment.

No information as to the position or strength of the enemy has yet been received; he shows only some infantry patrols. The battalion is to advance, and throws forward the 4th company as advance guard.

The diagram shows how the company advances, half in skirmishing groups, half in support.

Second moment.

The point of the advance guard comes in contact with the enemy's skirmishers; in rear of them are seen subdivisions in formation.

The 4th company deploys its remaining two sections, and drives in the skirmishers by a vigorous attack; left flank advanced, in order to discover the position and strength of the adversary.

3rd company doubles forward, to act as reserve to the line of skirmishers.

1st and 2nd companies follow as main body.

Here we are struck at once by the regularity with which all such manoeuvres are carried out in Germany. In them, as in battles, there is no such thing as the advance of a long thin line, whether skirmishers or otherwise, without supports. A force, however small, retains depth as well as breadth, until actually in contact with the enemy, and then, in almost every instance retains a reserve. We shall have to speak of this question further on.

Third moment.

The enemy checks the march of the 4th company, by a superior fire of skirmishers, and taking the offensive against the left flank, repulses the 4th company.

The left flank of the 4th company is thrown back so as to form a defensive angle with a section in formation close to the point; skirmishers on the left.

The 3rd company 200 paces behind the left wing faces the out-flanking enemy as a support.

Fourth moment.

The enemy continues to press the left flank and, at the same time,

advances against the front. His strength is now known; he has two companies attacking in front and two attacking the left flank.

The 3rd company moves up to the left flank, not prolonging the wing as thrown back, but inclined at an angle to it, so as to threaten the flank of the enemy's advance. One section is deployed as skirmishers, the other two remain in formation to fire volleys.

The 1st and 2nd companies move up rapidly.

Fifth moment.

The fire of the left wing has checked the enemy; but, meanwhile, he has pushed forward in front with one company in skirmishing order and one in formation.

Hereupon the 1st company moves to the front in skirmishing order:

Hereupon the 2nd company halts and forms line as support.

Rapid fire is ordered.

Sixth moment.

The enemy slowly draws back his right wing which he had advanced, and takes up a position in front with two companies in skirmishing order and the companies in formation.

The 4th company advances from the left wing, group by group, up to the line occupied by the 1st company. Each of them have two sections in front skirmishing, and one in support.

The 2nd and 3rd companies form company columns as a reserve.

There is no need to follow the author through the next four movements during which the enemy makes a front attack, and is beaten by the employment of the 2nd and 3rd companies in a flank counter-attack. Sufficient has been given to show the style and scope of the book. But we may examine with profit some of the maxims laid down by the author and the methods of handling troops proposed by him. It is often justly said that the science of tactics is only that of common sense. But how long has the world required to arrive at such growth of common sense as now seems simple to some people? Not even yet for all. So is it with the tactical considerations laid down by Major Helvig. They are based on common sense, yet without help any Officer would spend a campaign in working them out for himself. No amount of ordinary drill even when combined with general maxims can teach the handling of troops *in answer to the movements of an enemy*. For instance, common sense and all the books teach that infantry should keep a reserve ready for emergencies. Yet there are times when the whole force must be sent in to win, every man being pushed forward into the attacking line. Here is a question which neither drills nor books can answer. It must be settled on the spur of the moment, and the only good preparation for the time of decision is the habit of handling troops in the field under conditions approaching as nearly as possibly those of war. But, to take an officer fresh from common drill and place him suddenly in charge of a body of men manœuvring against another force is to task his resources unfairly and probably to injure his style of tactics. Some intermediate steps are

required similar to the exercises which a fencing master gives his pupils between the teaching of thrusts and parries, and the final loose practice. Moreover, the *maître d'armes* brings his pupil back again and again from loose practice to steady lunging and parrying by order, to strengthen his wrist and steady his eye. These examples of Major Helvig are just the intermediate practice required in tactics, and we have no hesitation in saying that the book supplies a very pressing want. With Major Helvig's examples in his hands, no commanding officer can now have any difficulty in teaching his subordinates the science of tactics.

The first point that fixes the attention, among a multitude of details, is the method of handling infantry for attack and defence, so as to develop the full power of breech-loaders. Major Helvig makes full use of the swarm formation, which, after much controversy, has been admitted as the latest method of infantry fighting, and he shows how adaptable it is to circumstances. For we are not to imagine that infantry so broken up into skirmishers are always to remain so. On the contrary, one of the most valuable features of the new formation is that the fighting line admits of contraction as well as expansion, and can be reinforced, from supports and reserves, without in any way altering its character or deranging its action. In looking through Major Helvig's diagrams, we find his battalions invariably kept in hand at first, then follows the fan-like spread, including first skirmishing line, supports, and reserves; then occasionally, at critical moments, a pushing of the supports, or even reserves, into the front line, sometimes in skirmishing order, sometimes with serried ranks to fire volleys. We find the front line itself changing its character from moment to moment. Now it consists of skirmishers only, anon, threatened by cavalry, it collects in groups or rallying squares; again, it dissolves when the cavalry are repulsed, and is presently reinforced by the coming up of all supports and reserves, some of them extending or thickening the chain, others strengthening its powers of cohesion by more solid links. But, in all cases, as soon as the action is decided, even for a time, the moment of relief from the enemy's pressure is seized to re-establish order and re-form the battalion. This practice of pulling the troops together as often as possible is highly necessary as an antidote to the natural tendency to disorder, which is the one weak point of the new tactics. If it is not taught and insisted on, from day to day, nothing will save infantry from confusion, and we may come to see battles lost by reckless charges and pursuits pushed beyond reasonable limits, like the famous charge of Prince Rupert's cavalry. By such practice will also be corrected the inclination of the skirmishing line to disappear in the centre and stream round both flanks of the enemy, and another tendency, almost equally injurious, to occupy too much space of frontage without supports or reserves. No soldier who has seen the swarm system of tactics carried out, either abroad or at home, can doubt the reality of these dangerous tendencies or deny that they must be provided against by careful instruction, just as the soldier, armed with a breech-loader, must be taught not to waste his ammunition.

The next important feature of Major Helvig's teaching is the frequent and bold use of cavalry, and the success he allows them—not a success, so far as to inflict positive defeat on infantry, but to waste the time of an enemy, and oblige him to desist from prosecuting his present purpose. The chief value of the book is its evident impartiality. Each arm plays a part in his examples, fairly proportioned to its power under the circumstances, and there are no exaggerated views as to the action of infantry, cavalry, or artillery. If the balance inclines at all, it is to the side of the infantry, and this is no fault. Without question no encouragement given to another arm could compensate for the discouragement of infantry if it were taught that it must constantly yield to the fire of artillery or the charges of cavalry, and we hold it advisable during peace manœuvres to give less than the true value to the power of artillery fire, while encouraging batteries to act with bold decision. But in these days cavalry also requires some encouragement and should be caused to execute charges against infantry more frequently than is now the custom. For, in truth, infantry fire is not the deadly thing on a battle-field that it appears to be on the practice ground, and a plucky charge of cavalry will often turn the scale if balanced or even inclining the other way. Take Major Helvig's twenty-seventh example at the seventh moment. Our force is one battalion and a squadron against one battalion and a-half of the enemy, who have deployed a chain of skirmishers which is already superior to ours in number and seems about to envelope our left flank. Our squadron charges his left, and under cover of the confusion so established, we push forward two companies hitherto in reserve and so outflank the enemy's left, forcing it back with ease, because we caught it prepared for cavalry, not ready to combat the fire of a line of skirmishers. Everybody acknowledges that a first-rate cavalry leader is very hard to find, seeing that he must possess certain natural qualifications not often found united. But every cavalry Officer might be brought up to a moderately satisfactory mark by such practice as these examples of Major Helvig, not reading them merely in his pages but working them out on the ground with a marked enemy, as steadily as he would execute parade movements. We would insist strongly upon the fact that the "tactical examples" are not to be treated as competitions between one Officer and another, but as a higher and more practical kind of drill than that, the sole end of which is attained when the men are sufficiently in hand, and the Officers expert enough to perform a few simple movements in preparation for tactical practice. The "examples" can be worked out even in a barrack square when no other drill ground is available, but we would advise the use of drill fields whenever they are available. No accidents of ground are necessary, for such as are spoken of in the "examples" may be marked in the same way as the enemy is to be marked, and the same example may be worked out two or three times in succession with such modifications as occur to the minds of the Officers. And another valuable point about Major Helvig's book is that it will afford to teachers of tactics (and all commanding Officers even of companies should be teachers), a large stock of questions to be put to those

whom they are bound to train. A general and well-founded complaint during autumn manœuvres, or the manœuvres of small bodies, as now practised with so much success at Aldershot, is that the fire of artillery cannot be truly estimated, because no one can tell what the guns a mile away are covering with their fire at any particular moment. In Major Helvig's examples there is no such difficulty. You are told that the artillery is firing heavily at such and such a mark, and you can decide on the course to be pursued, just as you would if your men were actually falling and becoming demoralized.

To attempt an examination of all Major Helvig's examples would be to write an essay on modern tactics, but we may, by analysing two of them—an attack and defence—get fair hold of the author's main ideas on the handling of the three arms in concert. For this purpose we will select Nos. 52 and 53 from the latter part of the second volume. No. 52 is the action of a brigade composed of 4 battalions, with a battery and 2 squadrons attached to it, the whole forming part of a division in an offensive action.

The "tactical considerations" supplied by the author, lay down certain rules, the first of which appears to us somewhat self-evident. It is that when detachments of cavalry and artillery are attached to a brigade of infantry for certain moments of a battle, they ought to be employed exclusively to attain the object set before the brigade; but the rules for such employment are practical and worthy of notice. Major Helvig says that a battery attached to a brigade to support the execution of an attack should exert all its power to facilitate the mission. It should direct its fire solely on the point which is to be pierced, that point being distinctly indicated to it. It must never answer the fire of the enemy's artillery. Just before the assault it must advance—at its own initiative—to whatever distance may be best for the efficacy of its fire. When the position is taken and the enemy retreats, the battery must push on without hesitation in pursuit. If the attack fails, the guns must hold their ground to the last extremity, in order to assist the defeated infantry to halt speedily and re-form to repulse the pursuit of the enemy.

The cavalry must watch from a distance the flanks of the attacking force which might be menaced, oppose without orders or hesitation every attempt at counter-attack, and, in order to utilize success, attack also without orders or hesitation any part of the enemy which seems to be so weak as to enable the infantry to continue its fire from the position as long as possible, and help the companies or battalions in pursuit. Here we have text enough for a long tactical treatise—leave our readers to ponder over the matter for them-

part of a division engaged in fierce fight with the enemy. The first brigade has hitherto borne the brunt of the action. The commander decides to attack the enemy's right wing, and orders the first brigade, with a battery and two squadrons. His orders are: "I have information that the enemy's main force is directed against our left wing. The second brigade will attack the enemy at the point A (farm, local posi-

The next important feature of Major Helvig's teaching is the frequent and bold use of cavalry, and the success he allows them—not a success, so far as to inflict positive defeat on infantry, but to waste the time of an enemy, and oblige him to desist from prosecuting his present purpose. The chief value of the book is its evident impartiality. Each arm plays a part in his examples, fairly proportioned to its power under the circumstances, and there are no exaggerated views as to the action of infantry, cavalry, or artillery. If the balance inclines at all, it is to the side of the infantry, and this is no fault. Without question no encouragement given to another arm could compensate for the discouragement of infantry if it were taught that it must constantly yield to the fire of artillery or the charges of cavalry, and we hold it advisable during peace manoeuvres to give less than the true value to the power of artillery fire, while encouraging batteries to act with bold decision. But in these days cavalry also requires some encouragement and should be caused to execute charges against infantry more frequently than is now the custom. For, in truth, infantry fire is not the deadly thing on a battle-field that it appears to be on the practice ground, and a plucky charge of cavalry will often turn the scale if balanced or even inclining the other way. Take Major Helvig's twenty-seventh example at the seventh moment. Our force is one battalion and a squadron against one battalion and a-half of the enemy, who have deployed a chain of skirmishers which is already superior to ours in number and seems about to envelope our left flank. Our squadron charges his left, and under cover of the confusion so established, we push forward two companies hitherto in reserve and so outflank the enemy's left, forcing it back with ease, because we caught it prepared for cavalry, not ready to combat the fire of a line of skirmishers. Everybody acknowledges that a first-rate cavalry leader is very hard to find, seeing that he must possess certain natural qualifications not often found united. But every cavalry Officer might be brought up to a moderately satisfactory mark by such practice as these examples of Major Helvig, not reading them merely in his pages but working them out on the ground with a marked enemy, as steadily as he would execute parade movements. We would insist strongly upon the fact that the "tactical examples" are not to be treated as competitions between one Officer and another, but as a higher and more practical kind of drill than that, the sole end of which is attained when the men are sufficiently in hand, and the Officers expert enough to perform a few simple movements in preparation for tactical practice. The "examples" can be worked out even in a barrack square when no other drill ground is available, but we would advise the use of drill fields whenever they are available. No accidents of ground are necessary, for such as are spoken of in the "examples" may be marked in the same way as the enemy is to be marked, and the same example may be worked out two or three times in succession with such modifications as occur to the minds of the Officers. And another valuable point about Major Helvig's book is that it will afford to teachers of tactics (and all commanding Officers even of companies should be teachers), a large stock of questions to be put to those

whom they are bound to train. A general and well-founded complaint during autumn manœuvres, or the manœuvres of small bodies, as now practised with so much success at Aldershot, is that the fire of artillery cannot be truly estimated, because no one can tell what the guns a mile away are covering with their fire at any particular moment. In Major Helvig's examples there is no such difficulty. You are told that the artillery is firing heavily at such and such a mark, and you can decide on the course to be pursued, just as you would if your men were actually falling and becoming demoralized.

To attempt an examination of all Major Helvig's examples would be to write an essay on modern tactics, but we may, by analysing two of them—an attack and defence—get fair hold of the author's main ideas on the handling of the three arms in concert. For this purpose we will select Nos. 52 and 53 from the latter part of the second volume. No. 52 is the action of a brigade composed of 4 battalions, with a battery and 2 squadrons attached to it, the whole forming part of a division in an offensive action.

The "tactical considerations" supplied by the author, lay down certain rules, the first of which appears to us somewhat self-evident. It is that when detachments of cavalry and artillery are attached to a brigade of infantry for certain moments of a battle, they ought to be employed exclusively to attain the object set before the brigade; but the rules for such employment are practical and worthy of notice. Major Helvig says that a battery attached to a brigade to support the execution of an attack should exert all its power to facilitate the mission. It should direct its fire solely on the point which is to be pierced, that point being distinctly indicated to it. It must never answer the fire of the enemy's artillery. Just before the assault it must advance—at its own initiative—to whatever distance may be best for the efficacy of its fire. When the position is taken and the enemy retreats, the battery must push on without hesitation in pursuit. If the attack fails, the guns must hold their ground to the last extremity, in order to assist the defeated infantry to halt speedily and re-form to repulse the pursuit of the enemy.

The cavalry must watch from a distance the flanks of the attacking force which might be menaced, oppose without orders or hesitation every attempt at counter-attack, and, in order to utilize success, attack also without orders or hesitation any part of the enemy which seems to be wavering, so as to enable the infantry to continue its fire from the conquered position as long as possible, and help the companies or battalions sent in pursuit. Here we have text enough for a long tactical sermon, but must leave our readers to ponder over the matter for themselves.

The brigade forms part of a division engaged in fierce fight with the enemy, but has not hitherto borne the brunt of the action. The commander of the division decides to attack the enemy's right wing, and reinforces the brigade with a battery and two squadrons. His orders are given in these words: "I have information that the enemy's reserves are marching against our left wing. The second brigade will attack the right of the enemy at the point A (farm, local posi-

"tion, wood, &c.), retaining a regiment as a general reserve behind his left wing. The two squadrons, which are observing the left flank, and the battery which has just arrived, are placed under the orders of the brigade. Hasten the attack."

This is a thoroughly typical example of the orders given by German Generals of Division, who would as soon think of directing how the brigade was to advance as they would of saying to the Brigadier, "It is going to rain, turn up the collar of your great-coat."

The General of Brigade hereupon sends the following order to Officers commanding regiments and battalions, as well as to his new adjuncts, the battery and detachment of cavalry.

"Reinforcements of the enemy are marching against our left wing; the brigade is to carry the point A."

"Regiment No. 2 will execute the attack."

"Regiment No. 1 will remain provisionally in general reserve, and follow, extending beyond the left wing."

"The cavalry will watch with its scouts the approach of the enemy, will hold him back if possible, and charge as soon as the attack of regiment No. 2 has succeeded."

"The battery will prepare the attack energetically, taking up a position to the left front."

"I am to be found with the principal line (regiment No. 2.)"

We commend these orders to the attention of our military readers as containing everything necessary, yet leaving room for plenty of initiative on the part of the various commanders, who must, however, be well trained men to be so trusted.

The enemy observes the advance of the brigade, and immediately directs upon it a heavy fire of artillery. Regiment No. 2 has disposed its first and second battalions as first and second lines, the first being skirmishers with supports and reserves, the second company columns. Regiment No. 1 advances with its two battalions in echelon from the right, both in company columns.

The enemy's right wing appears to be reinforced and a hot fire issues from it. Regiment No. 2 sends up the reserves of the first battalion to the fighting line in prolongation of the left, and supplies their place with half the 2nd battalion. Regiment No. 1 sends up its 1st battalion at a double beside the second half of the 2nd battalion. Two columns are now seen advancing in the distance, one to join the right wing of the enemy, the other to attack our left flank. Thereupon Regiment No. 1 occupies with its 2nd battalion a position on the left flank, while the rest of the brigade push on towards A. The attacking line, reinforced by half of the 2nd battalion, which moves up in prolongation of the left wing, and at 400 paces from A, begins to envelope the enemy's right. The battery pushes on to within 1,000 paces (800 yards) of the enemy's position A. The cavalry detaches half a squadron to assist the part of the first regiment occupying the position in flank, the rest of the horsemen continue their forward movement with the attack.

The enemy accelerates the march of his right column and deploys in skirmishing line all the troops in the position A. Regiment No. 1

sends forward part of each company of its 1st battalion as skirmishers. These and the 2nd regiment advance against A. Our cavalry charges the enemy's advancing right column, which is stopped by the charge. The other column of the enemy also hesitates and appears inclined to retreat. The whole of our forces advance rapidly, and the position is carried, but the column of the enemy which was checked by the cavalry again advances with clouds of skirmishers towards our left flank.

At this stage Major Helvig sends to the rear as wounded, two battalion commanders, six company leaders, and six subalterns. Regiment No. 2 occupies the captured position and regiment No. 1 sends both its battalions against the flanking column, upon which the battery opens fire. The cavalry concentrates near the battery. The column retires, but the enemy has gained time to retire in good order.

The brigade is ordered to occupy the position and defend it to the last extremity. It forms in good order with the battery on the left of the skirmishing line. The cavalry press on to the front to reconnoitre.

In this example we see employed in the fighting line of skirmishers at the critical moment the whole of the 2nd regiment, except two companies, and a section of each company of the 1st battalion, 1st regiment. We see the cavalry delaying the advance of the enemy's re-inforcements by charging them boldly, and the battery pushing on to within 800 yards of the enemy's position, the whole force being used with decision and energy. Delay might have been fatal to success, for the re-inforcements might have joined the enemy and made him too strong to be resisted.

In the 53rd example a similar force, namely, four battalions, one battery, and two squadrons, form part of a division in a defensive action. The author again insists that the artillery and cavalry are to act solely with regard to the present emergency. The artillery is to fire at the advancing infantry of the enemy, and on no account allow itself to be turned from this object whatever it may suffer from the enemy's artillery. It must endeavour to cover the hostile infantry with projectiles, flanking it, if possible, and especially that flank which is likely to be the objective of a counter-attack. If the orders are to hold the position at all cost, or if the general situation demands, the battery must on no account seek safety in retreat, but continue its fire even if the enemy are at the very muzzles of the guns. Major Helvig says with great justice, "The abandonment of the defensive position " by artillery is from a moral point of view the first half of defeat for " the infantry, and half a victory for the assailant."

The cavalry must be constantly watching and gaining information, and then assist and render more energetic the counter-attack. It may possibly have opportunities for short counter-attacks even while the brigade is still on the pure defensive, but must beware of prematurely expending its material and moral strength, lest it should not be available for the counter-attack. Above all, it must bring to an end, as quickly as possible, all uncertainty as to the disposition and force made by the attacking enemy; by that means it will fulfil the important mission of enabling the General of brigade to decide where

and how his counter-attack ought to be made. The brigade is in order of march with the usual advance guard, consisting of one squadron, one battalion, and two guns. We may observe here in passing, that the Germans hold fast to the idea of very strong advanced guards, in this case nearly a third of the whole force. The point of the advanced guard sends back word that a strong column of the enemy, composed of all arms, apparently about a brigade, is approaching. At the same time, the Commander of the division sends orders for the brigade to occupy as quickly as possible the position A B, and hold it until the second brigade has passed a defile, and is able to take the defensive. The brigade Commander halts the advance guard, and tells it to occupy the left of the position with its squadron and two guns outside the left flank. The first battalion of the main body places itself on the right of the battalion of the advanced guard. The rear regiment is ordered to occupy the right of the position, but this disposition is shortly afterwards changed. The four guns of the main body are pushed rapidly to the right front of the position; the cavalry of the main body outside the battery. Thus, in fact, each body of troops is sent to occupy the part of the position nearest to it. But the enemy now opens fire from a battery against the left wing of position, and seems to be re-inforcing his right wing. The brigade Commander evidently thinks that his left is threatened. He halts one of the battalions of the rear regiment, holding it ready until he is certain, and sends two guns from the right to the left flank. The cavalry dashes out to get information, with orders not to attack. It brings back word, that the enemy, who is now deployed, shows four battalions on his right wing. Upon this the 2nd regiment, which is in front, brings up its reserves into the fighting line. The first battalion of the 1st or rear regiment sends three of its companies to act as reserve for the 2nd regiment, and throws one company into skirmishing order on the left to guard the flank of the guns. The other battalion is brought up to act as general reserve, 300 paces behind the reserves of the fighting line and near the left flank.

We have now arrived at the 4th moment when the enemy begins to envelope the left wing. The 2nd regiment which is in the first line throws back its left flank, and the guns are withdrawn gradually, without limbering up, into line with the infantry. The general reserve battalion wheels a little to its left, and moves up so as to be 300 paces behind the left flank of the front line. The enemy continues to develop his attack against the left wing, and the brigade Commander orders his general reserve to make a counter-attack breaking out from the left flank. The cavalry is ordered to attack also, the rest stand fast. The enemy's attack is checked, but so is the counter-attack and the battalion which made it, has to fall back again with serious losses. At this stage Major Helvig sends to the rear two battalion Commanders, four company leaders, ten subalterns. The battalion which has made the counter-attack is sent rapidly to the rear to rally behind the left flank. The cavalry rallies behind the battery.

By this time the 2nd brigade of the division has passed the defile and begins to make its presence felt by the enemy, who retires slowly

without giving opportunity for another serious action. Our left flank which had been thrown back is advanced again, the battery also moves forward and plies the retiring enemy with its fire. The infantry is assembled, one regiment occupies the position, the other in reserve. The second brigade pushes on, and the one whose movements we have followed, is ordered to rest for a while in the position it has defended.

Now, if all this is not actual war, it is at least as clear an imitation of it as is possible during peace, and familiarity with such exercises may, with great advantage, be made to precede and alternate with manœuvres against actual troops with opposing Commanders; at least no one can say that practice so systematically conducted can lead to unsteadiness in the field.

We hope we have said enough to show the thoroughly practical character of Major Helvig's book and its value, not only to professed students of the military art, but to all Officers as a means of self-instruction and a hand-book from which to instruct others. We have now to draw attention to the fact that the volumes were written by a Bavarian Officer attached to the great general staff at Berlin, and translated or at least published by a similar organisation in Paris whence issue continually excellent works, translated or original, and published at very moderate prices. Some of the best intellects in the German and French Armies are employed on such duties, for it is recognised that the distribution of information is one of the legitimate and most valuable functions of a general staff. May the day soon come when Officers of the English Army will not have to hunt through foreign catalogues for such books as this, nor be left in doubt as to the value of them since their names alone can be taken as an index of their contents. An Intelligence Branch has been added to the office of the Quartermaster-General as a sort of nucleus for that General Staff, which is at least as necessary for England as for foreign countries. Is the establishment always to remain at its present inadequate strength, and are students to be thrown back upon private enterprise for all hope of reading in their own language, books of the greatest importance, but not likely to bring in a profit to any firm of publishers? In saying this, we do not undervalue the excellent work which has already been achieved by the Intelligence Branch. We ask for more of it, and more officers to execute it. The fact that it has done so much is the best argument for asking that it may be given power to fulfil the duties entrusted to it. Among those duties none is more pressing than the diffusion of military information by means of the printing press.

THE NEW FRENCH R FLE.

(Condensed from the *Revue d'Artillerie*, Feb., April, 1876. By Captain R. A. E. LIVESAY, R.E.)

The Chassepot, under the official designation of rifle of pattern 1866, was, as is well known, introduced into the French service in that year. Its manufacture was then actively proceeded with; and on the outbreak of the war in August, 1870, about 1,200,000 had been finished. The French fought the campaign of 1870 and 1871 chiefly with it, when its good and bad qualities were thoroughly recognised.

At the close of the campaign, the French Minister of War ordered an inquiry to be held as to the manner in which the Chassepot of 1866, as well as its cartridge, had acted during the time they had been in the hands of the troops. This inquiry was made, and brought to light the necessity of making certain improvements in the arm, and more particularly in the cartridge.

The cartridges, like those of the Dreyse rifle, are self-consuming, and as such, their advantages are (1) simplicity in the breech-mechanism of the rifle, a cartridge extractor not being necessary; (2), small relative weight of cartridge-case. These great advantages are, however, accompanied by serious defects in reference to transport and self-consuming power; the cartridges ought to be sufficiently durable not to deteriorate when transported, either in large or small quantities, and burn away completely when the rifle is fired. These conditions are to a certain extent contradictory, and up to this time have not been completely fulfilled; and consequently the disadvantages inherent in the cartridge showed themselves quickly on service. The cartridges were not sufficiently durable, and particularly those carried by the soldier soon deteriorated; also the residue in the chamber after each discharge accumulated to such an extent as to lead to difficulties in the way of charging the rifle after a number of rounds had been fired. Besides these great disadvantages, there were other minor ones, and it was with a view to do away with or minimize them all, if it were possible, that the Vincennes Commission of the 3rd Sept., 1872, with General Douay as president, was formed.

The attention of this Commission was at first directed to certain proposals brought forward with a view to improving the self-consuming cartridge of the Chassepot rifle, 1866 pattern; but the Commission soon recognised the extreme difficulty, if not the impossibility of producing, within a reasonable time, a self-consuming cartridge which

would not necessitate changes in the rifle, and they expressed their opinion that the best plan would be to substitute, for the self-consuming cartridge, a metallic one.

With a view to this substitution, many propositions had been made since 1866; but there were practical difficulties; as in the Chassepot the cartridge was placed at a considerable distance (1·4 inch) from the end of the chamber, it would be most difficult to adapt to the breech-mechanism an extractor which would easily remove a metallic cartridge occupying a position so far in as the self-consuming cartridge did; there would not be, it is true, much difficulty in the case of those rifles still in the workshops, in which the cartridge-chamber had not been as yet formed, and the rifles in hand could be provided with new barrels, but such a substitution, in the latter case, would be a heavy business; it was then proposed to try and effect the necessary modifications by boring out the old chamber and inserting a new tube adapted to the metallic cartridge. A number of trials as to the best practical method of re-tubing the old rifles were then carried out; many gave satisfactory results, and the Commission arrived at the conclusion that the re-tubing could be successfully adapted to a metallic cartridge; many proposed methods of firing the cartridge were also considered, which were more or less good, according to the cost of transformation.

It was next considered necessary to examine into the question whether the manufacture of new rifles should be carried out according to the plan adopted for the alterations of the old rifle, or whether a rifle, original in all its parts, should not be adopted, the old rifle being altered according to a simple and expeditious plan. This double question was carefully and laboriously gone into, and it was decided that if a method of conversion sufficiently good for a new rifle was hit upon, new arms should be manufactured according to the plan adopted. Although by this decision the difficulties of the problem were somewhat increased, the question of unity of armament had such weight with the Committee that it mainly influenced their decision. In spite of the practical difficulties of the question, this decision of the Committee must be looked upon as a happy one, as in consequence the re-armament of the troops can be proceeded with rapidly, and the delay consequent on the introduction of an entirely new pattern rifle avoided, during which delay, the manufacture of rifles of the old pattern would have to be proceeded with, and these would have, later on, to be altered. The Commission then continued its inquiries; it examined into the shape of the ball, the manufacture of the cartridges, and experimented on several descriptions, and finally adopted a cartridge of diameter at base of case = 13·8mm. = ·55 inches, and containing 5·25 grammes = 81 grs. powder.

Several descriptions of rifles were submitted to the Committee, but after the preliminary trials, two were chosen as fulfilling more nearly than the others the conditions laid down by the Committee, and in order to decide between these latter, an exhaustive system of trials was forthwith instituted.

These selected systems were 1st, the Beaumont, already in use in

Holland; 2ndly, that proposed by Mons. Gras, Chef d'Escadron in the French artillery.

The Beaumont system is sufficiently well known not to need a description here; and it would have to be modified for cavalry and artillery purposes; hence unity of armament would not be secured.

System Gras.—This system consists in re-tubing the barrel, re-placing the breech block by a new arrangement, allowing of the employment of a metallic cartridge. The spiral spring is, as in the Chassepot, the basis of the striking arrangement. By the system Gras, unity in the armament of the cavalry and infantry is obtained.

From the above it will be seen that the two proposed systems lead to a change in the breech-mechanism of the old pattern rifle, further, that the breech-arrangement of the Chassepot could be altered so as to be used in connection with a metallic cartridge, but it was not considered possible to utilize it by any transformation which would have been sufficiently satisfactory to be adopted as the model of the new rifle. This is mainly due to the fact that the metallic cartridge necessitates a considerable striking power, and in consequence a more powerful spiral spring, which cannot be manipulated directly, but requires a self-cocking or automatic arrangement; and finally the mechanism of the 1866 pattern was not adapted to limiting the projection of the striker beyond the extremity of the breech-block by an invariable quantity.

The two inventors having adapted their systems to the cartridge proposed by the Commission, the trials were proceeded with on a large scale in several corps.

Regulations were drawn up and approved of by the War Minister in November, 1873, to the effect that the trials were to be conducted by three regiments of infantry, one regiment of cavalry, and one of artillery; each regiment of infantry to receive 100 rifles (50 new and 50 converted), the cavalry and artillery, each 90 rifles (45 new and 45 altered). Each infantry rifle was supplied with 1,000, and each cavalry and artillery rifle with 500 cartridges.

These rifles were manufactured at St. Etienne. The new ones were provided with a sword bayonet (*épée bayonet*) having a leathern scabbard, the converted ones retaining the old pattern sword bayonet (*sabre bayonet*).

The arms thus provided were submitted to various tests equivalent to several years' continuous service, and corresponding as nearly as possible to the actual exigencies of a campaign.

With each rifle supplied to the infantry:—

- (1.) 30 rounds were fired each day;
- (2.) 500 rounds of snapping;
- (3.) 130 rounds continuously without cleaning;

The object of the snapping being to test the breech-mechanism.

At the end of the thirty days' trial each rifle had fired 1,000 rounds of ball cartridge. The rifle was snapped 15,000 times. These figures represent approximately the number of shots, &c., fired by a rifle in five years.

In the artillery and cavalry each rifle fired:—



Fig. 2.

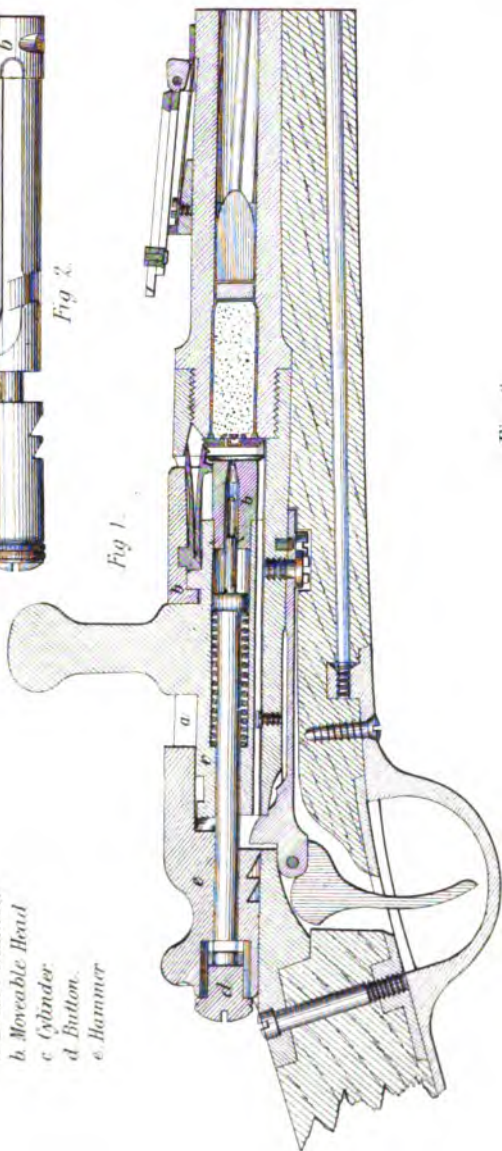


Fig. 1.

a Breech Chamber
b Moveable Head
c Cylinder
d Button.
e Hammer

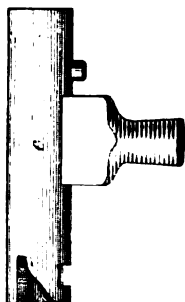


Fig. 3.

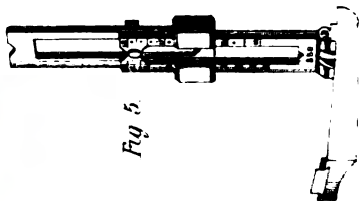


Fig. 5.



Fig. 4.

- (1.) 15 ball cartridges daily ;
- (2.) Was snapped 500 times ;
- (3.) And fired 75 rounds continuously without being cleaned.

Finally, during the last fifteen days of the trials, in each regiment, five rifles of each system were exposed night and day in the open air, and were employed in the trials without being taken to pieces or cleaned. In addition to the firing tests, the cartridges were specially tested in reference to durability, when carried in ammunition-waggons and in the men's knapsacks.

At the end of the trials, a report was made from each corps, and was forwarded to the Minister of War, who transmitted them, with his observations, to the Committee of Artillery, and finally to a Commission presided over by Marshal Canrobert. The conclusions of this Committee, which were as follows, were adopted by the President of the Republic, in an Order, dated 7th July, 1874.

The Commission recommended :—

- (1.) The Gras system.
- (2.) The new pattern sword-bayonet for the infantry (*épée bayonet*).
- (3.) The modification of certain parts of the mechanism.
- (4.) That the sword-bayonet (*épée bayonet*) be provided with a steel scabbard.
- (5.) That the new arms on the Gras system be officially designated rifles, carbines, &c., 1874 pattern, and the converted ones on the same system, rifles, carbines, &c., pattern 1866-1874.

Infantry Rifle, 1874 Pattern.—The new rifle is like the Chassepot in appearance, but differs from it in the principle of the cartridge, as well as in the breech-mechanism. The rifle is provided with an *épée bayonet*, and its general dimensions, &c., in English measures, are as follows :—

Length of rifle	4·2804 feet
Length of sword blade	1·7121
Total	5·9925 = 6 feet.

Weight of sword bayonet	1·7632 lbs.
Ditto, without scabbard	1·2342
Weight of rifle	9·2568

Total weight of rifle and bayonet .. 10·4910 = 10 lbs. 8 oz.

The principal parts of the rifle are as follows :—

The barrel of the rifle is of cast steel, of the same shape and dimensions as the Chassepot. Its calibre is 11 mm. = $\cdot 433$ inches; the total length of the barrel is 820 mm. = 32·29 inches; the rifled portion of which is 768 mm. = 29·92 inches; it has 4 grooves each 0 mm. 25 = $\cdot 01$ inches deep, nearly; the area of the lands = that of the grooves, and the two are connected by arcs of circles of $\frac{1}{4}$ of an inch radius, the twist is right handed, and makes one complete revolution in 21·6 inches. The dimensions of the chamber of the barrel correspond with

those of the cartridge, so that when the latter is home, the point of the bullet is just at the entrance of the rifled portion. It is provided with a fore-sight similar to that of the old rifle, and the bayonet is attached to the barrel in the same manner. The barrel is screwed on to the breech, and a portion of its upper edge is chamfered off so as to allow the claw of the extractor to slip over it and catch behind the projecting edge of the base of the cartridge-case, when the breech-block is pushed home.

The Chamber (Figs. 1 and 2).—The breech-chamber does not differ much from that of the Chassepot. The general dimensions are pretty much the same with a view to uniformity of the new and converted rifle. The rear of the chamber has, however, been slightly modified, so as to maintain the anterior part of the breech-block firmly in the direction of the axis when it is drawn back or pushed forward. At the other end of the breech-chamber a small portion has been chamfered away so as to contain the extractor when it is pushed forward.

A projection or re-inforce above the upper surface, on the right hand side of the chamber, gives a firm bearing to the base of the lever, when the latter is turned down. Its anterior extremity is formed into a screw surface, so that while being turned to the right, the base of the lever slides on this screw surface, drives forward the breech-block, and locks tightly its movable head against the base of the cartridge, and brings the spiral-spring into its greatest state of compression. The breech-block is stopped when drawn back to its proper extent, by means of a stop-stud passing through the side of the chamber, and it acts in the same way as in the old pattern rifle. At the bottom of the chamber, near its posterior end, the head of the cartridge-ejector projects above the lower surface of the chamber, and tips up the end of the cartridge-case when the base of the latter strikes against it as the breech-block is drawn back. The main spring for discharging the rifle by pulling the trigger is fixed to the under exterior surface of the chamber, in the same way as in the Chassepot.

The breech-block (Figs. 1 and 2) is composed of seven pieces, as follows:—

- (1.) The cylinder.
- (2.) Moveable head.
- (3.) Cartridge-extractor.
- (4.) Striker or needle.
- (5.) Spiral spring.
- (6.) The hammer-button (*manchon*).
- (7.) The hammer.

The cylinder (Fig. 3) serves to close the breech, its axis is hollow, and contains the spiral-spring which is wound round the striker or needle. The lever of the cylinder is attached to its upper surface. The base of lever fits exactly between the projections on the chamber, and so guides the cylinder when it is drawn back or pushed forward. When the lever is turned down to the right and the breech chamber closed, its end abuts firmly against the projection on the breech, to which, accordingly, the recoil is transmitted. In front of the lever and on

the side of the cylinder, is a projecting stud made to fit a corresponding groove in the movable head-piece (*lête mobile*) when the lever is vertical, so that the two pieces then become connected, and are moved backward and forward together. The exterior surface of the cylinder has two grooves cut on it; in the lower, the tip of the mainspring and the ejector-stud are contained when the lever is vertical, and the cylinder drawn back or pushed forward; the side one, in the same position, contains the stop-stud, and is curved off at its end at right angles, the rear curved portion is a screw surface similar to that at the end of the re-inforce on the chamber; these two grooves are connected by a transverse one, into which the ejector-stud passes when the lever is turned down and the breech closed.

At the base of the cylinder is a mortise (Fig. 3), the right hand side of which is formed into a screw surface; connected with the hammer is a projection similarly formed. When the rifle has been fired, these two surfaces are in juxtaposition, touching; the effect of turning the lever to the left is to make the screw surface of the cylinder slide on that of the projection on the hammer, and as this latter cannot rotate, the curvilinear motion of the cylinder produces a rectilinear motion of the hammer, which draws back with it the striker, thus compressing the mainspring, and so cocking the arm automatically. When the cylinder has been sufficiently rotated to the left, a small projecting stop-wedge attached to the hammer passes into a corresponding notch in the base of the cylinder, and the two are then connected. The cylinder is the only piece of the breech-mechanism which is capable of receiving a rotatory motion.

Moveable Head-piece (Figs. 1 and 2).—The object of this portion of the breech-block is to obtain a firm pressure against the base of the cartridge (for which purpose a recess in its fore part is made to fit exactly the base of the cartridge), and to contain the extractor. The front portion is cylindrical, and of the same diameter as the exterior diameter of the cylinder of the breech-piece; the hind part is also cylindrical and fits the hollow axis of the cylinder. Its axis is pierced to allow the striker to pass through, the fore part being circular and the hind part elliptical in section. The corresponding length of the striker is similarly formed, so that when the striker has acted, the moveable cap and striker do not move round with the cylinder when the latter rotates. On the outside are three grooves, the lower one to allow the ejector-stud to pass along, the lateral one, which in a certain position is in prolongation of the lateral groove of the cylinder, allows of the stop-stud passing freely, and finally a transverse one, which acts as a gas escape in case of the breaking of the base of a cartridge. On the upper surface of the moveable head-piece is a re-inforce or projection, the interior of which is hollowed out so as to contain the cartridge-extractor; on the right side of it is a mortise, fitted so as to receive the stud on the cylinder when the lever is turned to the left; then the cylinder and the head become connected, and when the cylinder is drawn back, the head follows.

Extractor.—The extractor is a spring composed of two arms with a stud on the upper, which connects it to the moveable head-piece. The

lower arm is provided with a claw at its extremity, which is intended to grip on the base of the cartridge. The extremity of the upper arm is sloped off so as to form an inclined plane, so that when the breech-block is pushed forward it slides freely into the cavity prepared to receive it at the top of the breech-chamber, at the same time that the claw of the lower arm passes over the base of the cartridge and grips it. By this forward motion the spring is compressed, and the moveable head piece is firmly fixed transversely.

Striker (Fig. 1) is a steel needle of 7 mm. = .25 inch diameter, provided with a shoulder near its point, against which one extremity of the spiral spring abuts. The point is cylindro-conical, the portion of the striker between it and the shoulder of the striker being oval in section; in consequence of this particular form, when the striker has acted, it fits the corresponding cavity in the axis of the head, and when the lever of the breech-block is turned to the left, the striker is unable to turn with it. The other extremity of the striker is T shaped, and is fitted on to the button (*manchon*) that connects it with the cock.

The Spiral Spring (Fig. 1) is of steel spiral wire 1.5 mm. = .059-inch diameter, making twenty turns in .38 inches. One end of it bears on the shoulder of the striker, and the other against the opposite extremity of the hollow axis of the cylinder. When the rifle is cocked the compression of the spring = 29.6 lbs.

Button (Fig. 4).—The button connects the striker with the hammer; it is a hollow T corresponding to that of the T on the striker, and is fixed to it in the same manner as in the Chassepot.

Hammer (Figs. 1 and 4).—The hammer is shaped like that of the old rifle, it is hollow and allows the end of the striker to pass through it, and to be made fast to it by means of the button (*manchon*), which fits into a cylindrical cavity at its end. The button passes freely in the direction of the axis, and is made fast to the hammer by giving it a quarter turn. Above the cylindrical portion, is the swell of the hammer, which projects in front of the cylinder containing the button, and guides the cock in the motions of loading. At the junction of the projecting and cylindrical portions, is a screw-surface corresponding to that in the notch in the cylinder, so that after firing, when the lever is turned to the left, the screw-surface of the notch presses on that of the hammer, and so pushes the hammer back and cocks the rifle. On the under surface of the cock there are two safety notches for the purpose of allowing the rifle to put on half-cock.

Action of the Lock Mechanism.—The stiffness of the spiral spring not allowing of the rifle being cocked by the thumb, the action of loading and firing is executed in four motions, as follows:—

1. Opening of the breech.
2. Introduction of the cartridge.
3. Shutting of the breech.
4. Pulling the trigger.

1. To open the breech, turn the lever from right to left, and draw back the breech-block until its motion is arrested by the *stop-stud*; during the first part of this operation several mechanical effects are

produced, firstly: the rifle is cocked, for when the lever is turned from right to left, the screw surface of the notch of the cylinder acts on that of the cock, and as this latter cannot turn, it is forced back, carrying with it the striker and compressing the spiral spring, by a quantity equal to the projection of the screw-surface on the cock; this motion is complete when the stop-wedge on the cock enters the notch made to fit it on the cylinder—this is known by the click which occurs. The stop-stud presses against the hollow screw-surface of the groove on the cylinder, which latter is forced back, drawing with it the moveable cap and extractor, so starting the empty cartridge-case. From the above it is seen that the hammer receives two retrograde motions, one produced by the action of the notch in the cylinder on the screw-surface attached to the cock, the other from the pressure of the stop-stud on the screw-surface of the groove on the cylinder. By this double effect the rifle is cocked, the cartridge started, and the under groove of the cylinder is brought into its proper position, and the handle now being vertical, the entire breech-piece can be drawn back until arrested by the stop-stud, carrying with it the cartridge-case or cartridge, as the case may be; as the base of the latter strikes the bottom stud in the chamber, the upper extremity being held fast by the claw of the extractor; the effect of these pressures on the cartridge-case is to eject it forcibly.

2. The cartridge is put in in the usual way, and pressed home as tightly as possible.

3. The entire breech-piece is now pushed forward, and the lever turned from left to right, until down in its place. The rifle is then ready to be fired.

The effects produced by these motions are as follows:—

As the lever is pushed forward, the claw of the extractor slips over the base of the cartridge, and lays hold of it. The forward motion continues until the stop-stud abuts against the slope of the side groove, after which the lever can only be turned from left to right, which being done, the screw-surface on the base of the lever-handle slides on the corresponding screw-surface on fore part of the re-inforce of the breech chamber; by this means the moveable head is driven forward, and the cartridge firmly pressed into its place; the notch in the cylinder is disengaged from the stop-wedge attached to the cock, after which the cylinder turns freely until home, the forward motion of the hammer being prevented by the nose of the mainspring.

4. The trigger being pulled, the nose of the mainspring is depressed downwards, clears the hammer, and the latter being acted on by the spiral spring is carried forward, and with it the striker, and the charge is fired.

Safety Notch (Fig. 1).—In the experimental fire-arms supplied, a safety apparatus was used to prevent the rifles going off accidentally, but at the end of the experiments, and on the recommendation of the Commission such an apparatus was not considered necessary, and was consequently abandoned; it was, however, subsequently considered advantageous to be able to have the rifle loaded without being obliged to keep it on full cock. This was easily carried out by means of a notch

in a suitable position on the hammer, presenting also the advantage of relieving the pressure on the mainspring.

To put the rifle on half-cock, turn the lever partly to the left, the forefinger pressing the trigger, the thumb on the hammer, and allow the latter to slide forward until the click of the nose of the mainspring falling into the notch, is heard. The rifle is then half-cocked. To place the rifle on full-cock it is only then necessary to press the lever from right to left and then back into its proper place. The position of the safety-notch is determined in such a manner, that if the hammer does now go off, the striker has such a small space to go through, 1 mm. 5 = .02 of an inch, and the pressure of the spiral spring is so weakened, that the striker has no longer sufficient force to explode the detonator.

Sights (Fig. 5).—The back sight is composed of two pieces, one fixed, the other sliding on it, and also of a base; the latter contains a spring, and is soldered on to the barrel. The sight revolves on the extremity of the base as an axis, and can be turned down to the front or rear, or can be maintained in a vertical position. The left side of the fixed part is graduated for every 25 metres, from 400 metres up to 1,200 metres; the right side is graduated from 1,400 to 1,800 metres. The sliding part is provided with a notch at each extremity.

In firing at 200 metres, the sight is turned down to the front, and the notch at the base of the sight is used. For 300 metres, the sight is turned down to the rear, and the notch at the lower end of the sliding part is used. For 350 metres, the sight is vertical, and the notch at the base of the fixed part is used, the sliding part being pulled up out of the way. For 1,300 metres, the same as for 350, but the line of sight passes through the notch at the top of the fixed part. For 400 metres, the sight is vertical, the sliding part is pushed down, and the line taken through the lower notch on the latter. For 1,400 metres, the slide is down, and the line of sight passes through its upper notch. For 1,800 metres, the slide is up, and the line of sight passes through its upper notch.

In some rifles the notches are on the right or on the left of the plane of fire, in order to correct the lateral deviation of the rifle.

The mountings of the rifle are very similar to those of the Chassepot; the ramrod is different, and is secured in its place by means of a screw at its end.

Sword-Bayonet.—The sword (*épée*) bayonet, with bronzed steel scabbard, was adopted, instead of the sabre bayonet, to lessen the soldier's load, and also to facilitate firing when the bayonet is fixed.

Cartridge.—The metallic cartridge adopted by the Commission is composed of four principal parts:—

1. Powder case.
2. The detonator.
3. The lubricator.
4. The ball.

The powder case is of brass-foil and contains 5.25 gr. = 81 gra. of powder. The base is of iron, and contains the detonating arrangement, which communicates with the powder by means of small holes.

The detonator is composed of the copper cap, containing the usual detonating composition, and a detonator-cover, to keep the cap in its place.

The lubricator is placed in the cartridge-case, between the powder and the bullet, and is composed of a disc of greased felt, between two cardboard discs.

The bullet is of pure compressed lead, and is surrounded with a paper covering.

Manufacture.—The date of issue, &c., of the cartridge is stamped on the base, and the cartridges are made up in paper packets of six each, the cartridges being separated by means of a strip of paper passing between them.

Dimensions of the different parts of the Cartridge.

Thickness of base.....	2.15 m.m.
Length of case.....	37.30 m.m.
Total length of case.....	39.45 m.m. = 2.2 inches.
Projection of ball beyond case =	16.55 m.m.
Total length of cartridge =	76 m.m. = 3 inches.
Greatest diameter of base of cartridge	16.8 m.m.
Least ditto ditto	13.5 m.m.
Greatest diameter of cartridge case	13.75 m.m.
Least ditto ditto	11.75 m.m.
Weight of case..... =	12.9 gr. = 198 grs.
Diameter of bullet at the base =	11 m.m.
Length	27 m.m.
Weight	25 gr. = 386 grs.
Total weight of cartridge.... =	43.8 gr. = 676 grs.
Weight of 10 cartridges =	15½ oz.

Ballistic Qualities.—The following table shows the initial velocities of the new pattern rifle compared with those of the '66 pattern:—

Arms.	Pattern '66.	Pattern '74.
	m.	m.
Transformed rifle	420	450
Carbine	405	435
Musket	390	415

There results from this augmentation of velocity an increase in range and a flatter trajectory, without a corresponding increase in recoil. Rapidity of fire is also increased, due to the automatic action of the lock. Accuracy of fire is also increased.

The following tables show the trajectories of the new rifle, for different ranges:—

TABLE I.—*Heights of Trajectory above the Line of Sight.*

At distances of	25	50	75	100	125	150	175	200	225	250	275	300	325	350	375	400	450	500
Metres range																		
200	1.4	.25	.32	.36	.35	.28	.17	0	-.23	-.53	-.89	-1.28	..	-2.34	..	-3.57		
300	.23	.45	.67	.77	.86	.92	.92	.82	.74	.61	.30	0	.40	.85	-1.34	-1.88		
400	.35	.70	1.04	1.24	1.47	1.60	1.75	1.78	1.79	1.73	1.59	1.40	1.24	.78	.44		-1.00	-2.61

TABLE II.

Distance.	100	200	300	400	500	600	700	800	900	1,000	1,100	1,200	1,300	1,400	1,500	1,600	1,700	1,800
Metres.	Met.	Met.	Met.	Met.	Met.	Met.	Met.	Met.	Met.	Met.	Met.	Met.	Met.	Met.	Met.	Met.	Met.	Metres
200....	.36	0	-1.28	-1.88														
300....	.77	.82	0	0	-2.61													
400....	1.24	1.78	1.40	0	0	-3.36												
500....	1.76	2.80	2.96	2.09	2.81	0	-4.62	-5.70										
600....	2.32	3.92	4.76	4.36	6.11	3.97	0	0	-7.05									
700....	2.98	5.24	6.62	6.98	8.26	5.00	5.00	6.27	0	-8.60	-10.33							
800....	3.70	6.67	8.77	9.85	9.69	8.26	5.00	0										
900....	4.48	8.24	11.12	12.98	13.61	12.98	10.48	6.27	0									
1,000....	5.34	9.96	13.70	16.42	17.91	18.12	16.50	13.15	7.74	0	-10.33	-12.27						
1,100....	6.28	11.84	16.52	20.18	22.61	23.76	23.08	20.67	16.20	9.40	0	0	-14.41					
1,200....	7.30	13.88	19.58	24.26	27.71	29.88	30.22	28.83	25.39	19.61	11.24	0						
1,300....	8.40	16.10	22.90	28.70	33.25	36.53	37.98	37.70	35.36	30.69	23.42	13.70	0	-16.80				
1,400....	9.60	18.40	26.50	33.50	39.25	43.73	46.38	47.30	46.16	42.69	36.62	27.69	15.59	0	-19.41			
1,500....	10.90	21.08	30.38	38.67	45.72	51.50	55.44	57.65	57.80	55.63	50.86	43.22	32.42	18.12	0	22.28		
1,600....	12.28	23.87	34.56	44.24	52.68	59.85	65.38	68.79	70.38	66.55	66.17	59.93	50.51	37.61	20.88	0	-25.23	Metres
1,700....	13.78	26.84	39.02	50.28	60.10	68.75	75.57	80.66	83.69	84.39	82.40	77.74	69.80	58.39	43.04	23.74	0	28.96
1,800....	15.39	30.06	43.81	56.61	68.15	78.40	86.84	93.53	98.17	100.48	100.19	97.04	90.72	80.91	67.27	49.49	27.36	0

TABLE III.

Distances in metres.	Angles of Elevation in degrees.	Angles of Descent in degrees.	Dangerous space for Infantry. H. 1·70 m.	Dangerous space for Cavalry. H. 2·50 m.	Time of Flight. sec.	Final Velocities in metres.
0	0° 0' 0"	0° 0' 0"	..	..	0	450
100	0° 10' 56"	0° 11' 40"	..	..	0·24	391
200	0° 23' 24"	0° 26' 34"	..	..	0·51	346
300	0° 37' 33"	0° 45' 6"	130	190	0·81	310
400	0° 53' 31"	1° 7' 37"	86	127	1·15	281
500	1° 11' 25"	1° 34' 29"	62	91	1·52	257
600	1° 31' 33"	2° 6' 4"	46	68	1·92	237
700	1° 53' 32"	2° 42' 46"	36	53	2·36	220
800	2° 18' 1"	3° 24' 51"	28	42	2·83	205
900	2° 44' 56"	4° 12' 38"	23	34	3·33	192
1,000	3° 14' 26"	5° 6' 24"	19	28	3·87	181
1,100	3° 46' 37"	6° 6' 6"	16	23	4·44	171
1,200	4° 21' 35"	7° 12' 3"	13	20	5·04	162
1,300	5° 59' 28"	8° 24' 17"	11	17	5·68	154
1,400	5° 40' 22"	9° 42' 40"	10	14	6·35	147
1,500	6° 24' 23"	11° 7' 2"	9	13	7·05	141
1,600	7° 11' 37"	12° 36' 44"	8	11	7·79	136
1,700	8° 2' 7"	14° 11' 24"	7	10	8·56	131
1,800	8° 55' 59"	15° 50' 32"	6	8	9·36	126

The times of flight were determined as follows : two observers, each provided with a stop chronometer, placed themselves mid-way between the target and the firer, and noted, one the report of the rifle, and the other the sound of the impact of the bullet on the target. The difference between the two times gave the time of flight.

Table showing comparative Ballistic Properties of the different Rifles now in use in the Armies in Europe.

Pattern.	Calibre.	Weight of Bullet.	Initial Velocities.
	Inch.	Grains.	Feet.
France { 1874	·433	385	1,476
{ 1876	·433	385	1,378
Germany, 1871, Mauser	·433	385	1,469
England, 1871, Martini-Henry.	·45	480	1,312
Austria { 1867, 1873, Werndl..	·421	310	1,400
{ Do. do.	·421	370	1,476 with new cartridge
Bavaria { 1869, Werder	·433	340	1,444
{ Do. do.	·433	385	1,460 with German do.
Italy, 1870, Vetterli	·409	308	1,397
Russia, 1871, Berdan	·421	370	1,420

The examination of the last table shows that, with the exception of Italy and England, all the European powers have adopted, as did France in 1866, a small-bore rifle, varying in calibre from ·421 to ·433 inches, firing a bullet of between 370 and 385 grains, with an initial

velocity of from 1,476 to 1,400 feet per second. The results obtained by these rifles are, moreover, so nearly equal, in regard to rapidity of fire and ballistic qualities, that it may be said now, as in the days of the old smooth-bore, that European armies are almost equally well armed, and that hereafter, as in the past, success will depend above all on the use made of the rifle provided, and hence that all our efforts should be directed towards teaching the soldier to make the best possible use of it. It is necessary to bear in mind, in practising with any rifle, that the initial velocity of the bullet, the trajectory described, and, in consequence, the elevation of the rifle, are not constant quantities. According to season, temperature, barometer, &c., these quantities are subject to considerable variation, and a change of temperature equal to 20° C, often causes the bullet to strike 16" above or below the mark aimed at, at a range of 200 metres.

NOTES ON NAVAL MATTERS.

THE PROJECTION OF GUN-MUZZLES BEYOND THE SIDES OF SHIPS.

Now that the number of guns with which the most powerful ships are armed is being usually reduced to about four in turret ships, and half-a-dozen in broadside ships, and all of them, in both cases, are being mounted upon more or less delicate machinery, the question of the degree to which their muzzles project from the ship's side is becoming one of importance. In our "Inflexible" the guns, when run out, will project several feet beyond the side, owing to the turrets being placed near to the side, in order to facilitate bow and stern fire. It is obvious that an enemy, by simply steaming past her while the guns are run out, might inflict great injury upon the machinery of both guns and turrets; and although it may be said that the turret and guns can be turned away, or that an enemy would expose herself to great danger by attempting this manoeuvre, still it is not by any means impossible that a skilful and daring enemy might contrive in this way during an action, to cripple the great ship, and even to put her turrets and guns *hors de combat*.¹ Even a vessel of extremely inferior power, if well handled, might accomplish this if no provision were made against it. The Admiralty and its advisers have recognised the force of these considerations by providing for the "Inflexible" being fitted with fixed external sweep-pieces, or curved fenders, in wake of the turret, on either side, for glancing or turning aside an enemy's blow; and although the efficacy of this remedy may, in some easily-conjectured cases, be doubted, the adoption of the device shows that the Government are sensible of the risk involved, and have taken the best available means of diminishing it. It is curious to note how differently this practical source of danger has been dealt with in the Italian and in the Austrian Navies, which shared in the only practical experience of ironclad warfare that Europe has afforded. In the Italian turret ships "Duilio" and "Dandolo" the turrets are placed ex-

¹ In a discussion on Naval Tactics, at this Institution, on the 31st May, 1875 (*Vide Journal*, Vol. IX, No. 82, page 516, *et seq.*), Admiral Sir Henry Codrington mentioned the account given him by the Commander of a German gunboat, of the action between his vessel and a French gunboat, off the Havannah, when he described the effect of the stem of the Frenchman raking along his ship's side, and not only carrying away the channels, so that his rigging was cut away and his masts came down and fouled his screw, but also struck, capsized, or turned round his three guns, which he was ready to fire into the Frenchman.—Ed.

tremely near to the side, and the guns being very long, their projection beyond the side will be very great,—we have heard it said that it will be as much as 11 feet, with the guns run out. We cannot vouch for this, nor do we think the projection can well be so great, even with the 100-ton guns, but it will be so great as to make it exceedingly difficult to fully remedy the defect by permanent projecting sponsons like the sweep-pieces of the “Inflexible.” In the Austrian navy, on the other hand, which is presided over by an officer, Admiral Pöckh, who highly distinguished himself at Lissa, and in which we observe many evidences of practical improvement, the very opposite remedy is resorted to. In the design of the new and powerful ironclad “Tegethoff” now building at Trieste, the side with its armour is indented curvilinearly to a sufficient depth to provide for the gun muzzles being always within the general line of the ship’s side, even when the guns are run out. It has been suggested that the real object of this was that for which a similar arrangement has before now been proposed in this country, viz., that of giving great lateral training to the gun with a comparatively small port. That this object also is furthered by the plan we do not deny; but it was not for this purpose that the recession of the side was actually resorted to. This fact has been decisively established, and the true object of the Austrian authorities clearly affirmed by the designer of the ship, Chief Constructor Herr Romako, who, in a letter addressed to Mr. Reed (and cited by him at the Institution of Naval Architects), said, “The ship “‘Tegethoff’ is in many regards a novelty, its casemate allowing an “all-round fire, avoiding, at the same time, by its particular form, the “dangerous projection of the muzzles of the midship guns, in consequence “of experience acquired in the battle of Lissa, but which are very little “known, even in our own navy.” These words are as decisive as they are important, and show that we have actual experience in war to confirm the views above expressed. It may be inferred from the difference of procedure in the two navies, in respect of this matter, that the battle of Lissa did not convey the same lessons to both of the combatants.

THE NEW AUSTRIAN IRONCLAD “TEGETHOFF.”

A brief summary of the characteristics of this important ship, now under construction at Trieste, as the latest embodiment of Austrian naval opinion, will be interesting to our readers. We may mention that she is, in a peculiar degree, the embodiment of naval opinion in Austria, inasmuch as her design is the consequence of the prolonged inquiries and deliberations of a very carefully selected Committee which sat for several months at Trieste, although Herr Romako, the Chief Constructor of the Vienna Admiralty, is no doubt personally responsible for the technical details, and for the calculations of the ship. In a paper presented to the Institution of Naval Architects a few weeks ago, Mr. Reed gave the following general dimensions and particulars of her: “Length between the perpendiculars, 286ft. 11½in.; length, “total, 303ft. 1½in.; breadth on the water-line, 62ft. 9in.; extreme

"breadth to outside of armour, 71ft. 1½in.; depth of hold, 34ft. 9 in.; draught of water, aft, 26ft. 7½in.; draught of water, forward, 23ft. 1in.; displacement with the half of provisions, 7,390 tons; area of the midship section, 1,301 square feet; area of the load water-line, 14,308 square feet; height of metacentre above centre of gravity of displacement, 14.623ft; height of metacentre above water, 4.770ft.; distance of the centre of gravity of displacement before the midship section, 0.356ft; depth of the centre of gravity of displacement below water, 9.853ft; co-efficient of displacement, 0.582ft.; co-efficient of water-line, 0.782ft.; co-efficient of midship section, 0.82ft.; displacement of an inch immersion at the load water-line, 34.47 tons; weight of armour and backing, 2,160 tons; the armament consists of six 11in. Krupp guns. Area of sails, 12,165 square feet; cost of hull, estimated, 172,790*l.*; cost of engines and boilers, estimated, 81,715*l.*; nominal horse-power, 1,200; number of cylinders, 2; diameter of cylinder effective, 125in.; length of stroke, 4ft. 3in.; Griffith's propeller, diameter, 23ft. 6in.; pitch, 24ft.; number of blades, 2; revolutions per minute, 70; number of boilers, 4; area of fire-grate, 850 square feet; heating surface, 25,500 square feet; superheating surface, 1,800 square feet; pressure of steam, 30 lb.; number of furnaces, 36; mean indicated horse-power, 8,000; speed, estimated, 14 knots. From these figures it will be seen that although we are not dealing with a ship of the 'Inflexible' (English) or of the 'Dandolo' (Italian) type, in which armour of excessive thickness is placed over a central citadel of extremely limited extent, we nevertheless have a very powerful ship indeed, with armour of apparently about 13in. to 14in. thick, and with a concentrated battery of six 11in. Krupp guns, each weighing, I presume, about 27 tons. The ship has a belt of armour extending from the stern to within about 30ft. of the foremost perpendicular, where it terminates in a transverse armoured bulkhead, and a stout iron deck going forward to the stem at about 7 feet below water." The "Tegethoff" has a long projecting under-water spur—it projects 9 feet from the stem at the load water-line, and 19 feet from the stem-head. Nearly all double curvature is excluded from the armour plates. The battery is of the projecting type adopted by Mr. Reed in the upper decks of the "Audacious" class, and on the main decks of the German and Chilian ironclads designed by him. The battery is traversed by a bulkhead which cuts off the two foremost battery guns from the remainder, after the plan adopted by Mr. Barnaby in the "Alexandra." The ports are thrown back from the outside of the side, as explained in a previous paragraph.

THE PORT AND DOCKYARD OF VENICE.

Considerable expense is being incurred by the Italian Government in the improvement of the Dockyard at Venice, and in the port and its approaches. When there last year, we had an opportunity of inspecting the new graving docks, one of which was being constructed of concrete in a novel manner. The use of concrete itself is not, of course,

any longer a novelty in dock construction, but in this case the floor of the dock was being formed of concrete in the water. The bottom was excavated to a sufficient depth (much exceeding the required depth of the dock), and then concrete, in a wet state as mixed, was being deposited over the whole floor. A descending hopper, which opened only when the bottom was nearly reached, was employed for the purpose, and was made to deposit successive charges side by side by means of an overhead crane, which travelled across the dock, floated upon pontoons, which were moved along the dock longitudinally as required. We were informed at the time that the new docks, although of no great depth, were considerably deeper than the approaches; and great differences of opinion appear to exist among Italian engineers as to the practicability of improving, and as to the means of improving, the Venetian channels. Professor G. Lanon has published in the *Revista Maritima* an interesting discussion upon the dockyard approaches, and upon schemes for improving them, a summary of which is translated and printed in the newly issued volume of the *Proceedings* of the Institution of Civil Engineers (vol. 43, p. 363). The wonder is, that in a place like Venice, the Government does not have recourse to the system of hydraulic lift with pontoons, such as is in use in this country and at Malta and Bombay; or else of the tubular hydraulic dock of Messrs. Clark and Stansfield. By this means they would be able to place their ships upon pontoons in the deep water near the sea, and then transport them to the dockyard establishment, and back again, with the greatest ease.

IMPERIAL GERMAN FRIGATES.

The two principal ironclads in the Imperial German squadron, now in the Mediterranean, are the "Kaiser" and "Deutschland." These are sister ships, built in England, and completed in March and August respectively last year. Their principal dimensions are—length between perpendiculars, 280 feet; breadth, extreme, 62 feet 8 inches; depth in hold, 37 feet 6 inches; displacement, 7,300 tons; extreme draught of water, 24 feet. The engines, by Messrs. John Penn and Sons, of Greenwich, are horizontal trunk surface condensing, fitted with superheaters, steam starting gear, &c., with a boiler pressure of 30 lbs., and are capable of developing 8,000 indicated horse-power. The mean speed at full power, when tried at the Maplin Sands, was $14\frac{1}{2}$ knots, and at half-boiler power $13\frac{1}{4}$ knots. In these vessels Mr. Reed has introduced an arrangement by which when the screw is disconnected for sailing, the weight of the screw and after-piece of shaft may be taken on friction rollers, and it is hoped that this arrangement may considerably reduce the dragging power of the screw when the ships are under sail alone. The armament is of Krupp's guns and consists of eight 26 cm. ($10\frac{1}{4}$ -inch) 22-ton guns in the midship battery, and one 21 cm. ($8\frac{3}{4}$ -inch) 9½-ton gun in the stern battery. These guns are on the main deck, a few small guns for saluting purposes being carried on the upper deck in addition. The midship battery overhangs the side, and is so arranged that the foremost gun on either side is capable of firing 2° across the

keel, the fire from the two guns converging about three ships' lengths ahead. The aftermost gun on either side of the battery can be trained to within 15° of the keel, from which point the fire is taken up by the stern gun, so that the advantage of an all-round fire is secured. The thickness of armour at the water-line in wake of engines, boilers, and magazines is 10 in., elsewhere amidships 8 in., tapering to 5 in. at the stem and stern on the belt. The armour on the midship battery is 10 in. at the port sills and 8 in. elsewhere, and on the stern battery 8 in. The vessels are ship-rigged, the area of plain sail being 29,000 square feet. They are equipped with steam steering-gear, steam capstan, auxiliary fire-engine, and very efficient pumping and ventilating arrangements. Mr. Reed has carried his principle of broadening and shortening ships farther in these vessels than in any of his previous designs, the proportions of length to breadth being $4\frac{1}{2}$ to 1, and they must certainly be classed among the most successful of his ships, the designed speed of 14 knots having been exceeded by half a knot, and the steering powers proving, as might be expected, extremely good.

THE CHILIAN IRONCLADS "ALMIRANTE COCHRANE" AND "VALPARAISO."

The Chilian ironclads, "Almirante Cochrane" and "Valparaiso," are sister ships, built from Mr. Reed's designs by Earle's Shipbuilding and Engineering Company, Hull. They were completed last year. The principal dimensions are—length between perpendiculars, 210 feet; breadth, extreme, 45 feet 9 inches; depth in hold, 28 feet 10 inches; displacement, 3,400 tons. The engines are by Messrs. John Penn and Sons, of Greenwich, and are twin screw on the compound principle, with horizontal cylinders and surface condensers. They develop collectively 3,000 indicated horse-power, giving a mean speed of 13 knots. The armament consists of six $12\frac{1}{2}$ -ton guns by Sir W. Armstrong and Co., in a midship battery. The battery is arranged with embrasures, so that the foremost gun on either side can fire right ahead, and the aftermost gun on either side right astern, with sufficient training to enable them to fire slightly abaft and before the beam respectively. The midship gun on either side also fires from an embrasure port which gives it a training of from 20° abaft the beam to 70° before it. The armour on sides is 9 inches at the water-line and 6 inches elsewhere amidships, tapering forward and aft. On the battery the armour is 8 inches at the port-sills and 6 inches elsewhere. Protective deck plating $\frac{3}{4}$ inch thick is fitted before and abaft the battery on the main deck. These ships are barque rigged, and carry 12,000 square feet of plain sail.

THE IMPERIAL BRAZILIAN IRONCLAD "INDEPENDENCIA."

The Imperial Brazilian turret-ship "Independencia" was ordered in 1873, the contract for building her being given to Messrs. J. and W. Dudgeon, of Poplar, the duty of inspecting the building being undertaken by Brazilian officers. Owing to an unfortunate failure at the first and second attempts to launch her, by which she was very much

injured, and the subsequent failure commercially of Messrs. Dudgeon's firm, she is still in a very unfinished state, in the large dock at Woolwich Dockyard. The necessary repairs and the work of completing her are now, however, being carried on, and it is hoped that she will be completed in about a year's time. The principal dimensions are—length between perpendiculars, 300 feet; breadth, extreme, 63 feet; depth in hold, 28 feet 10 inches; displacement, 9,000 tons; extreme draught of water, 25 feet. The engines are by Messrs. John Penn and Sons, of Greenwich, similar to those in the "Kaiser," and "Deutschland," but to develop 8,500 indicated horse-power. The armament is four 35-ton guns, carried in two turrets, and two 8-ton guns on the upper deck forward. The guns are made by Sir Joseph Whitworth of steel. One of the 35-ton guns has been tried in France by the French Government officials, and the publication of their report is awaited with much interest. The armour on sides amidships is 12 inches and 10 inches; on battery, 9 inches and 8 inches; on the bow battery, 8 inches and 6 inches; and on the pilot tower, 8 inches and 6 inches. Protective deck plating is fitted on the main deck before and abaft the battery, the thickness being 3 inches amidships and 2 inches forward and aft. The "Independencia" is to have large sail-power, and be in every respect a sea-going turret-ship. She is designed to have a freeboard of 11 feet to the upper deck, and will be fitted with falling-down topsides. A poop and forecastle are to be fitted, and the ropes are to be worked on a flying deck entirely over the turrets. Steam steering and capstan gear will be provided, also steam and hand turning gear for the turrets, and the turret guns are to be loaded by Sir W. Armstrong's hydraulic machinery.

JAPANESE WAR SHIPS.

The Imperial Japanese Government is having an ironclad corvette built in this country. She is of 3,700 tons displacement, 220 feet length between perpendiculars, 48 feet breadth, extreme, and 28 feet 8 inches depth in hold. Her engines are to be on the compound principle, twin screws, with horizontal cylinder and surface condensers. They are to develop 3,500 indicated horse-power, and are estimated to drive the ship at 13 knots. The armament is to be supplied by Krupp, and will comprise four 24 cm. ($9\frac{1}{4}$ -inch) 15-ton guns, to be carried in a midship battery on the main deck, and two 17 cm. ($6\frac{3}{4}$ inches) 5½-ton guns on the upper deck. The upper deck guns are carried amidships and are arranged to fire right ahead, on the broadside, and right astern. They are unprotected. The battery guns are placed at the four corners of the battery, and have very considerable fore and aft training in addition to the broadside fire. The armour on sides is 9 inches at the water-line and 7 inches elsewhere amidships; on the battery 8 inches at the port sills and 7 inches elsewhere. The vessel is to be barque-rigged, with about 12,000 square feet of plain sail. The same Government is also having built here two composite corvettes, which are to have a thin strake of armour ($4\frac{1}{2}$ inches) at the water-line in wake of engines.

THE ROYAL NAVY OF ENGLAND AND THE STATE NAVY OF FRANCE.

The following important communication on this subject has been contributed by a distinguished Naval Officer, who derived the information from a highly-placed foreign Official.—L. A. H.

1. An admirable article in the *Quarterly Review* (January, 1876), on British Shipping and Seamen, may perhaps be usefully supplemented by a statement showing how the French Government, by their system of War Reserves established by the great Colbert, not only provides, *first*, for an expansion in time of war, which will include, if necessary, nearly the whole of their merchant seamen and fishermen, but also, *secondly*, that during the process of drilling each man for three years at least, in a man-of-war, the whole body of French merchant seamen and their Officers shall be raised to a level much higher than that occupied by most of our merchant seamen as to intelligence and steadiness, which means safety, economical management, &c. We will first compare the ship's companies of an English and a French ironclad, and then the Naval Reserves of the two countries.

I.—THE SHIP'S COMPANIES.

2. There are remarkable differences in the composition of the ships' companies in French men-of-war and English men-of-war; the proportion of combatants in the former is much larger than in the latter, viz., 95 per cent. of the whole ship's company, whereas in the English ship-of-war only 75 per cent. are combatants, and of these, 9 per cent. are marines and 10 per cent. are boys.

3. An English ironclad of the "Vanguard" class has a complement of about 41 Officers, 60 marines, 46 boys, and 314 seamen, domestics, artificers, stokers, &c., but of the latter only about 197 are drilled to the use of weapons, leaving 117 artificers, stokers, domestics, &c., undrilled, or 25 per cent. of the whole crew of 461; whereas a French ironclad, of about the same class, will have only 5 per cent. non-combatants; and of the English Officers, none of the non-executives are taught, or expected to know, how to use the sword they carry. With a crew of 461, the French will have only 23 non-combatants, and 438 combatants, opposed to 344 English combatants, and nearly all the French combatants will be seamen; instead of marines, they have *matelots fusiliers*, and no boys; of the stokers even, a large proportion are seamen.

4. There can be no doubt, therefore, that (leaving out the question,

for the moment, the disputed point whether it is better to have "marines" or "matelots fusiliers") a French ship's company, *as far as its composition is concerned*, is much more efficient for *general war purposes* than, *cæteris paribus*, one of our own.

5. The above system, which provides for so very large a proportion of the ship's company being seamen, facilitates the drilling of the reserves, and enables the French nation to present her "outer line" of defence in a state of preparation, which is at once their boast and pride, and ought to be our envy, but I do not believe one Englishman out of ten thousand, or more than one member of the House of Commons, is really aware of what the French Reserve of seamen consists. It is well they should know it, in view of future probabilities.

II.—THE RESERVES.

6. The number of Officers and seamen afloat in the active service of France, together with those seamen whose names are on the list of the *Inscription Maritime*, and who are between the ages of twenty and forty, and have been for between three and five years on board a man-of-war, carefully instructed and drilled, is over 68,000! These seamen can at any time be recalled for further service, in case of war. The large majority of them are in France, in the coasting trade, fisheries, &c. The French merchant service is small, and, I believe, nearly stationary in numbers, but from it and from other seafaring classes, 7,000 men pass annually into the French Navy, and are retained for from three to five years; they join French men-of-war abroad. For this purpose, the legal claim on them commences at twenty and ends at forty-five; but as a matter of fact they are not retained after forty.

In the Crimean war, the number of Officers and men on active service was over 63,000.

In the German war, the number was 67,786. Of this number 28,740 were at Paris.

There were also at Paris 28,507 *marins*, or colonial soldiers (infantry and artillery), not including 13,000 left in the colonies.

The *marins*, most of whom have made long voyages, could be embarked as are our marines, for service on board ship, if necessary, swelling the number of Officers and men available for service in the fleet at the commencement of the German war to 96,283, without withdrawing the *marins* in the colonies.

It is evident that a large reserve of Officers would be required; this is amply provided for. More than 2,000 *capitaines de long cours* (merchant captains) and 3,000 captains of coasters, all of whom have passed from three to five years in the State Navy, and the former of whom (the *capitaines de long cours*) have had to pass a stiff examination—form the Reserve of Officers.

Note.—The contrast in acquirements, manners, and habits between a French *capitaine de long cours* and the ordinary master of an English merchant vessel is most unfavourable to the latter, and it can, therefore, be no matter of surprise that the crew of the English ship is, as a

general rule, in all but the first class "employs," thoroughly unsatisfactory, although there are other causes at work to bring about this most undesirable result.

7. The English Reserves consist of in round numbers—

4,000 Coast Guard men, chiefly petty officers, good seamen, well drilled.

15,000 Royal Naval Reserve men, and 2,000 Coast Volunteers; the former fair seamen, of whom perhaps about 9,000 are always in England; the latter fishermen.

1,000 Royal naval Artillery Volunteers.

6,000 Marines in barracks.

The seamen and marine pensioners available on account of age would probably be disposed of, as in our war with Russia, in replacing the Coast Guard men at their stations, manning harbour ships, and as riggers in dockyards.

Reserves of Officers:—

102 Lieutenants, Royal Naval Reserve,	} imperfectly drilled.
91 Sub-Lieutenants,	
74 Midshipmen,	

and about 200 chief Officers of Coast Guard, who have risen from the seamen class.

Retired Naval Officers.

8. There can be no doubt that, as regards Reserves of disciplined seamen drilled to the use of arms, the French are very much better off than we are, probably at least 100 per cent. better, especially when we consider that in time of war with a European power, or the United States, we should have to send numerous men-of-war to all quarters of the world, and provide for the manning of fast hired steamers, carrying a considerable stock of coal, armed for the occasion to act as convoy to our fleets of merchant vessels. As regards Reserves of Officers, the French are immeasurably better supplied; there is no comparison between us.

9. It may be said that large Reserves of seamen and of Officers are useless, if there are no ships to place them in, and that as our *ironclad* fleet is equal in number to that of the French, and superior in individual strength, we may content ourselves if we can man and officer our fleet; but ironclads can be sold, bought, borrowed, stolen! The ironclad fleet of Turkey, said to be the third in strength in Europe, and designed, I believe, by English Admiralty Constructors, might change owners as promptly and unexpectedly as the Khedive's shares of the Suez Canal, and the number of French ironclads be doubled in a few minutes, by the transmission of a few words by the electric telegraph to Constantinople from Paris.

10. It may be said that France is now, from interested and, therefore, from the most weighty motives, our most devoted ally, and must, of political necessity, remain so for many years. This is begging the question, but certainly Germany is not so situated, and if hard pressed by us, we being in alliance, say with Russia, Germany could easily

bait a hook, which would draw France to her side with unfailing certainty, viz., by offering to resign some of her late acquisitions.

11. There is growing and deepening conviction that obligatory military service, in some shape or other, modified probably when compared with the Prussian and French system, will be enforced on Englishmen on shore. This may or may not be practicable, and if practical, it may or may not be a wise step; but if it is attempted, seafaring men of every description will have to take their share of the infliction, and, of course, their service must be *afloat*. In that case our Reserves of seamen from the merchant service, coasting trade, and off-shore fishermen, if disciplined and drilled as are the French Reserves, will far outnumber them, and the marines might then be absorbed or become colonial corps for the Crown colonies.

12. When this question of obligatory military service is under the consideration of the Government, and the Naval portion of it is being discussed, the above information may, perhaps, be found useful.

NOTICE OF BOOKS.

Instructions for the Cavalry Regiments about to take part in the Exercises of the Combined Cavalry Division detailed from Regiments. By Major-General VON SCHMIDT. Translated by Major-General WALKER, C.B.: Blackwood & Sons, Edinburgh and London.

"I have nowhere but in Verdy's 'Studien,' in section 5, and in these "Instructions of General Von Schmidt, found what I have long sought "for, namely, a clear definition, not only of the duties of cavalry in "large bodies, but also of the ways and means by which these large "bodies can be practically utilised. . . . I am of opinion that since "the days of the great Frederick no such master of the art of lead- "ing cavalry has appeared as the late General von Schmidt."

Such is the high praise accorded to this distinguished cavalry Officer by General Walker in the short preface to this pamphlet. The Instructions were intended for the use of the Division which General von Schmidt was to have commanded in the autumn of last year, had he not been prematurely removed by death.

By the courtesy of the editor and publisher at Berlin, the Instructions were placed at the disposal of General Walker, who has done the British cavalry good service by translating them and making them public. We commend them to the close attention of all cavalry Officers. We hope to be able to notice them at greater length on a future occasion.

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LECTURE.

Wednesday, 7th June, 1876.

GENERAL SIR WILLIAM J. CODRINGTON, G.C.B., Colonel Coldstream Guards, &c., &c., &c., in the Chair.

MARITIME RIGHTS.

By JOHN ROSS-OF-BLADENSBERG, Coldstream Guards.

I HAVE been invited to draw your attention to the question of "Maritime Rights," a subject which has unfortunately been but too much neglected of late. An examination will, however, show that the exercise of these most important rights is necessary to our Power, and that, therefore, our existence as a nation is dependent on the restoration of our time-honoured customs of naval warfare. Much attention has been naturally given to the recruiting question. We must keep pace with the armaments which are being organized around us. It would, however, be fatal, if all our present efforts have not developed the natural forces of the country, but instead, have only copied the institutions of foreigners, who differ from us in national characteristics. Great Britain is essentially naval and commercial; it would be suicidal if we have inadvertently agreed to a rule, by which maritime action is paralysed in a war with a military power, and by which our mercantile shipping—the nursery of the Royal Fleets—would be lost to us, when the enemy is himself a naval power. Yet such is the case; a Declaration (of Paris), which was promulgated some twenty years ago, has crippled our national strength in this way. It is to this subject that I am to draw your attention.

In a pamphlet which I wrote, I attempted to describe the old law of maritime capture to be:—"That a belligerent had a right to seize the goods of its enemy. Thus, if England and France were at war, an English ship bearing the commission of the Sovereign, if it met a French merchantman with French cargo on board, could capture both ship and cargo. Again, if the English cruiser sighted a neutral—Dutch, suppose—the former could stop the latter, examine her papers, and if she were found to contain a French cargo, the cruiser could compel the neutral to take the cargo to a place of safety, where it could be made a prize (by order of the Admiralty Court), while the neutral ship, and neutral goods which might be on board,

“went free, the neutral carrier being paid by the captor the freight she would have received for the hostile cargo, had she performed her journey in safety. No injury whatever is intended to the neutral ship; her presence only cannot protect the property of the enemy. Again, as war opens up a market for articles useless in peace, the belligerent can stop and confiscate such articles, when destined for the enemy’s ports, no matter who the owner may be. These rules must be carefully distinguished from the illegal orders that have been frequently given with respect to capture, and from the old and equally illegal custom of forbidding neutrals *all trade* with the enemy. These have unhappily been too frequent; they have done a great deal of harm, because they have confused the minds of men as to what were the legal maritime rights; it having been often due to these improper rules that wars occurred. Let us, therefore, observe the difference between the maritime rights, as above shown—recorded in the *Consolato del Mare*, the oldest code of maritime laws known since Europe emerged from the dark ages, after the overthrow of the Roman Empire—and the unfair ordinances of France—which declared not only the enemy’s cargo a prize, but also the neutral carrier—as well as the atrocious Berlin and Milan decrees, and the equally unjust Orders in Council which followed.”

All jurists, men of different nationalities, up to the middle of the last century, have considered that the *Consolato del Mare* expressed the just law, and they confirmed it. Our own statesmen were most particular on the subject; and Lord Stowell, the celebrated Judge in the Prize Court during the beginning of this century, showed that the law was not made or enforced for England’s own benefit, but that it was her due according to natural right. Further, it was incorporated into the municipal laws of both England and France, and thus it became part and parcel of their state organization.

But England had other reasons to bind her to her old naval traditions. Our statesmen did not only argue on their justice, their actions also showed that the existence of the nation would be imperilled by their abolition.

In 1780, Great Britain was in great difficulties—at war with her revolted American colonies, harassed by discontents in Ireland, and attacked by France, Spain, and Holland, we were passing through a terrible conjuncture. This was the moment that Russia, supported by a league of several nations, chose to assert, by force of arms, that enemies’ goods should go safe in neutral ships, except contraband of war. England, although she had no force to oppose the league, did not give in to their pretensions. In 1800, when again entangled in a war, Paul I., of Russia, revived the Armed Neutrality of 1780; but this time we were more free to act, and Pitt and Grenville were at the head of affairs; a fleet was sent to the Sound, the battle of Copenhagen, and the defeat of the Danes, was the result, and the victorious fleet sailed to crush the other members of the League, Sweden and Russia. But a revolution had occurred. Paul was murdered, and his son Alexander changed the policy of the Empire, which was unable to withstand the action of England against

her trade. Peace was made, and the Armed Neutrality dissolved. Many of the speeches of public men of the time, show how the statesmen of the day valued our maritime rights. I would refer you to the speech from the Throne at the opening of Parliament, 1801, and the debate thereon, especially Lord Eldon's speech. In 1807, Russia left our Alliance, a declaration as if of war was directed against her, and in it these important words, so full of significance, occur:—"Those principles," namely, of maritime law, "it is the right and duty of His Majesty to maintain; and against every confederacy His Majesty is determined, under the blessing of Divine Providence, to maintain them. They have at all times contributed essentially to the support of the maritime power of Great Britain; but they are become incalculably more valuable and important at a period when the maritime power of Great Britain constitutes the sole remaining bulwark against the overwhelming usurpations of France; the only refuge to which other nations may yet resort in happier times, for assistance and protection." This was written after Austerlitz, Jena, Eylau, and Friedland.

But in 1854 all was changed; on the eve of the Crimean war we waived our maritime rights—those which were founded on justice, and custom immemorial, which were supported by all independent jurists for centuries, and which were defended by every British statesman, and by all our traditions. And at the negotiations of the Peace in 1856, a declaration was issued confirming the above renunciation, in the following terms:—

1st. Privateering is and remains abolished;

2nd. The Neutral Flag covers enemy's goods, except contraband of war.

Now this event created no noise, no astonishment, no consternation. No one protested that a mistaken policy had cut away from us one of our most time-honoured rights, and no one complained that traditions—nay, the laws of the land—were abolished without formality and without discussion. This, in a nation like our own, could only have become possible when a veil of forgetfulness and ignorance had dimmed the vision of the real cause of our former success. It must be remembered that naval power exercised by capture, is not so readily perceived as military strength—conspicuous in reviews and organization—and it is easy to forget the hidden causes of our greatness, when there is nothing to remind us of them. But observe the result. England's maritime rights, held in such estimation, have been abolished without trial; and instead of its being necessary for those who wished their destruction to prove that our old customs were barbarous and dangerous, the burden of the proof has now been shifted, and it remains for others to prove that our policy for centuries was not mistaken, and that the importance attached to a particular law by our greatest statesmen, was not absurd!

The only whisper—for no real accusation was ever brought against our old maritime rights, was (1) that neutrals would not permit us to exercise them, and (2) that they were antiquated and barbarous.

If our rights are just, it is not according to the British character

to give them up. Had England or Russia forbidden Prussia to use her *artillery* during the late war, would she have obeyed? And yet we gave up more, far more, than our artillery in the Declaration of Paris. But who were the powers that constrained us to yield our rights? It was not France, for her laws of capture were even more stringent than our own, as may be seen by those who follow out the French marine ordinances, many of which are detailed in Mr. Lawrence's note in Wheaton's International Law. Neither was it the United States, for that power has always maintained that, by right, enemy's goods may be seized in neutral vessels (*v. negotiations between France and United States, 1797-98*).

The injustice or barbarity of the old maritime law has equally never been shown.

1st. *Privateers* have been much abused; but as a great deal of piracy has gone on under that name, it is not, perhaps, extraordinary that a fierce cry should be raised against their employment. When we come, however, to examine what they really are, when performing their legitimate duty, it becomes apparent that they constitute—for England—a very strong and proper force. Privateers are private ships which obtain commissions from the sovereign to fight for their country. They are bound by very strict rules, and they cannot complete a capture, until the vessel taken is adjudged a good prize, in due course of law, in an Admiralty Court. After condemnation the capture, subject to certain reservations, becomes the property of the captors. Privateers receive no pay, they cost the country nothing. The legitimate employment of privateers has nothing to say to the grave irregularities which have occurred at different times, in which neutral vessels often took out letters of marque from a belligerent sovereign, to prey upon the trade of the other; this is naturally nothing but murder and piracy, and cannot be defended for a moment. Military nations organize into armies all their population capable of bearing arms, and naval nations are equally entitled to utilize their resources which consist in shipping; the masses of men which Germany can produce in her armies are a strength to her; the crowds of armed cruisers which England can send into every sea, and which would pay themselves on the commerce of the enemy, are an enormous strength to us; and why should we be deprived of that force? Up to a recent date in the world's history, there were no State Navies (if we except the Fleets of ancient Rome); maritime nations depended upon their private ships of war. Themistocles won the battle of Salamis, and freed Greece from the Persians, with the merchant shipping of Athens and the Islands: the Carthaginians used their mercantile fleets in their wars; and the Invincible Armada was put off a year owing to the Spanish commercial losses, caused by British privateers, and in 1588 was opposed by the English Fleet, in which there were only 34 ships belonging to the Royal Navy. An alliance of maritime nations might destroy Great Britain's superiority in some seas, if men of war—properly so called—were only employed; but no coalition could ever succeed in doing so, if England will only restore to herself the power she has of covering every corner of the

ocean with volunteer cruisers, and of sweeping any enemy off the sea.

2ndly. *Neutral Flag covers enemy's goods except Contraband.* The only argument that can be urged on apparently legal grounds to support this doctrine, is that the neutral merchantman is a continuation of the territory of the nation whose flag it carries, that this territory cannot be violated, and that therefore goods, even if belonging to an enemy, cannot be touched when on board. It is, however, always conceded that these vessels may still be searched, to prove their right to the flag they have hoisted, and to see whether there is any contraband of war among the cargo. But this search is *not* permitted when the merchantman is in neutral waters, under the *real* territorial protection of a neutral government, which clearly proves that when search is allowed on the high seas, there is no violation of neutral rights, and that, even on their own showing, their theory is without foundation. The capture of contraband of war is founded upon the truth, that neutral colours on the ocean do not indicate a portion of neutral territory, the capture of enemy's goods is founded on precisely the same principle; how then can anyone allow the first, and disallow the second?

The controversy is, however, easily set at rest, when we consider the *acts* of those nations who professed to believe in the sanctity of the neutral flag. Those who, in 1780 (during the first Armed Neutrality), were loudest in denouncing Great Britain's tyranny at sea, and in declaring that their sole desire was to secure the liberty of commerce; those very powers, when it suited them, turned round and vigorously enforced the old maritime law! Sweden did so in 1787, Russia also, in her war against the Porte, the same year; in 1793 she entered into a Maritime Convention with Great Britain, in which she engaged to use her influence to prevent neutrals from protecting the commerce of the French on the high seas; and in 1799 the Emperor Paul threatened the Danes with immediate hostilities on account "of their supplying assistance and protection to the trade of France, under the neutral colours of the Danish flag." France also went to greater lengths; in 1798 she declared that all *vessels* found on the high seas with any English goods whatever on board, to whomsoever belonging, shall be good prize; that neutral sailors found on board English vessels shall be *put to death*.¹

The doctrine "free ships, free goods" is one which cannot be substantiated in justice, and the coalitions which tried to force it upon us were merely attempts to deprive us of a natural supremacy which they feared; at other times they have all shown that it is right to seize enemy's goods in neutral vessels. And this cannot be contested by anyone, if they will only consider that as it is lawful to shed blood in war, it is also admissible to capture hostile property; and if so, who can believe that a neutral is discharging his duties of neutrality in protecting a belligerent by covering his trade? No land force would allow non-combatants to shield the enemy from a blow, why should sea forces permit them to do so? Before leaving this part of the subject, I would refer you to Ward's "Treatise on Maritime Law,"

¹ Alison's "Hist. of Europe," chap. xxxiii, § 3 and 11.

published in 1801, and reprinted in 1875; this short work embraces all that can be said on the legal side of the question.

It is very obvious that when nations go to war, their armies meet each other in order to invade or to protect territory. Land has a real value, and therefore its possession is a gain to an invader. Armies do not meet as champions to fight out the differences of their countries, but one belligerent seeks an objective and aims at a point least difficult to seize, and most inconvenient for the enemy to lose; thus are provinces overrun and capitals taken, the physical and political powers of the enemy are attacked, and the land forces manœuvre against each other in the field to accomplish or to thwart these ends. Frederick the Great, in 1756, occupied Saxony, and held it during the remainder of the Seven Years' War. Every one knows the advantage he derived from its resources, in fact, it gave him all the strength of a province of whose future welfare he was not so careful as of his own kingdom.

The ocean, on the other hand, is a barren waste, it cannot be occupied, and fleets do not meet each other for its possession. It is, however, a great highway, and across it, commerce and men are transported; naval wars are undertaken for the attack and defence of foreign trade. The wealth of a nation which goes by sea is immensely important to it; without it, Adam Smith has shown that it is impossible to carry on a foreign war. The supremacy of the sea, therefore, which enables a belligerent to destroy the commerce of his adversary, gives him power which far exceeds, in coercive force, military strength. I have not been able to ascertain the exact amount of German produce which left the country during the late war with France, but according to statistical returns, I see 52,000,000*l.* as the value of the imports into Hamburg during 1870. Taking, then, the exports of that town as 40,000,000*l.* (the ships that cleared were less than those that entered with cargoes), it is easy to see what a loss the French could have brought upon their adversaries, had they seized German produce; for had they been able to destroy the commercial prosperity of the merchants, the Government of Berlin would have found it difficult to support the waste of war in men, supplies, ammunition, and money in the heart of the invaded country. The maritime nation, then, that can capture the property of its enemy by sea—be that property much or little—must paralyse his military efforts, sever the sinews of his power, and bring bankruptcy upon the very resources which enable him to be aggressive.

A few incidents in some of the naval wars which have taken place, will bear out what has been here advanced.

The Illyrians were a restless and piratical people in ancient times, and they made great depredations on the commerce of Rome and Greece. The Senate having failed to obtain redress, prepared for war by sea and land (B.C. 219). The Romans were victorious, granting peace to the enemy under the terms that they should pay a tribute, abandon Illyria, a few places only excepted, and that they should never sail beyond *Tissus* with more than two frigates, and those unarmed. The war was principally by sea, and the Admiral alone received a

triumph; it gave great *prestige* to the Romans, and particularly in the eyes of the Greeks, who had been unable to check the scourge of the pirates. From this time also the Romans were admitted to the Isthmian games, and considered as part of the Grecian civilised world.

Later, pirates from Cilicia infested the Mediterranean Sea to such an extent that Rome, powerful as she was, found her trade and navigation nearly cut off, and thus a famine was apprehended in the capital of the World, caused by the action of a few corsairs. Many distinguished persons, Plutarch informs us, cast in their lot with these pirates, and their prosperity was very great. The people of Rome were, however, so affected by scarcity, that they invested Pompey with almost regal powers over the whole empire; he collected a large armament of 500 galleys, 120,000 foot, and 5,000 horse; he swept the seas, capturing a great many of the enemy, and defeated them in the naval engagement of Coracesium, where they had collected their fleets to oppose him. Plenty was immediately restored in Rome.

In 1527 the French, under Lautrec, invaded Italy. They were very successful, and early next year they nearly took Naples by a strict blockade by sea and land. Andrea Doria and the fleets of the Italian commercial republics were allied to the French, but Francis I. threw away all this advantage and success by folly. He attempted to injure the Genoese trade, and being opposed by Doria, he sought to arrest him. The Italian Admiral revolted to Charles V., restored plenty in Naples, and the French, having now lost their superiority at sea, were soon reduced to great straits for want of provisions. The French raised the siege, leaving their guns behind them; and after losing many of their men the small remains surrendered at Aversa. Doria now succeeded in liberating his own town, Genoa, from the yoke of Francis; these reverses enabled Charles to force upon his adversary the humiliating treaty of Cambray.¹

In 1535, also, Charles collected the maritime power of the Mediterranean, and defeated the famous pirate Barbarossa, the scourge of all Christian merchants in that sea. Six years later his expedition to Algiers to destroy another nest of pirates was not so fortunate, it was badly timed, and his ships were nearly all sunk in the storms which arose. The Emperor and the survivors escaped with difficulty.

The maritime power of the Turks was very great in the middle of the 16th century, and their fleets swept over the Mediterranean unopposed, notwithstanding the efforts of Spain and Italy. In 1565, however, they failed to capture Malta, only owing to the brave defence of the Knights of St. John, but in 1570 they took the Island of Cyprus. Philip II. made another attempt to check their victorious career, the navies of the Christian part of the Mediterranean were united under Don John of Austria, and the Turks were defeated at the great battle of Lepanto² (1571). This decisive engagement destroyed the Ottoman power in the Mediterranean, and from this moment may be dated the commencement of Turkish decline, for although their course of victory

¹ "Hist. of Charles V.," by Robertson, book 5. Dyer's "Hist. of Modern Europe," vol. i, p. 488, &c.

² Dyer's "Hist. of Mod. Europe," book iii, chap. vi.

made ourselves formidable to our enemies by the victories of Rodney and Howe.

The wars of the French Revolution, which lasted with little intermission for twenty-two years, began in 1793; during this period the continental nations were all in turn subject to Napoleon. England alone stood as his unconquered opponent, and as the rival which checked all his attempts at universal empire. A careful study of events will show that it was our power which ruined Bonaparte, and that his great object was to defeat Great Britain; he understood perfectly that with the world in his possession, he was still insecure and vulnerable if we held the sea, but that if the naval strength of England were destroyed, he at once would become universal Sovereign. At Ulm, in October, 1805, as the Austrians, who had capitulated, were paraded before him, he gave expression to this truth: "I desire no-thing," he said to General Mack, "on the Continent. France wants "only ships, colonies, and commerce; and it is as much your interest "as mine that I should have them."¹ But these he did not get. The victories of Howe, St. Vincent, and Duncan had laid bare the commerce of the enemy, and established anew our superiority over the fleets of France, Spain, and Holland. As a set-off, the genius of Bonaparte acquired conquest after conquest in Italy (1796-1797), which culminated in a naval expedition, the seizure of Malta, and the descent on Egypt. Nelson, who had been foiled in his endeavours to meet the French armament in its passage, came upon the fleet lying in the Bay of Aboukir, after the troops had landed. He immediately engaged and defeated it. The results of this splendid victory were very important; a third part of the naval force of France was destroyed, Great Britain obtained an irresistible superiority in the Mediterranean, the French commerce in the Levant was annihilated, all hope of conquest in Egypt was dissipated, and Napoleon's expedition was reduced to a mere military descent, without hope of reinforcement or retreat, in which the invading army must perish by its own triumphs.² These brilliant successes caused much discontent among the Allies, owing to the supreme power they gave us. Russia feared England's maritime strength far more than France's military pre-eminence: she proclaimed us the tyrants of the sea, and revived the attempt to rob us of our naval strength, by the second Armed Neutrality. The results of this have been already traced.

The next phase of the war was Napoleon's attempt to invade England. Admiral Villeneuve, although he evaded the fleets sent to pursue him, was unable to join the French armament at Boulogne, owing to the partial victory of Sir Robert Calder off the coast of Finisterre. Napoleon, seeing he could not even obtain a temporary command of the Channel (fifteen days was all he required, *v. Note* written at his dictation, September, 1805, "*Correspondence de Napoléon avec le Ministre de la Marine*"), changed his direction, marched into Germany, and after the capitulation of Ulm, and the victory of Austerlitz, subjugated Austria, and forced on her the Peace of Pressburg. By sea, however,

¹ Bain's "Wars of the French Revolution," vol. i, p. 437.

² Dyer's "Hist. of Mod. Europe," vol. iv, p. 356.

the French and Spanish fleets were still watched, while their commerce was exposed. Admiral Villeneuve, in trying to escape, was defeated in the great battle of Trafalgar, and the naval power of Bonaparte was reduced to a mere phantom, while our flag floated everywhere without a rival. An attempt to make peace proved abortive, and the French military operations still pursued a triumphant career; Prussia was overwhelmed at Jena; and Russia, defeated at Eylau and Friedland, made peace at Tilsit, in 1807. The French Emperor, now master of Europe, was unable to injure England, but the latter was able to harass him very considerably. Had Great Britain exercised justly her maritime rights, it is probable that France would have been bankrupt before this period. It appears, however, that, owing to certain enactments, a great deal of *bonâ fide* French produce was allowed to escape. A pamphlet, entitled "War in Disguise; or, the Frauds of Neutral Flags," published 1805, drew attention to this fact; and the annual *exposé* of the state of France laid before the Legislative Assembly, 16th January, 1804, declares that out of 200,000,000 livres which might have been captured by England, more than two-thirds of that amount had been saved.¹

After 1806 the course of the war was unfortunate. Napoleon tried to close the ports of the Continent, and thundered out his Berlin and Milan decrees, wild threats against all trade, which he could not carry into effect. Great Britain answered by the famous Orders in Council, illegally creating paper blockades. We had the power, and did carry out these orders, but we only succeeded in oppressing ourselves and our friends. They were called retaliative, but they were not so, they overstepped the law; they did France no more harm than the legitimate exercise of maritime rights would have done, and they alienated the United States from us, producing, in 1812, the war which followed.

Russia, at the peace of Tilsit, had bound herself to observe the French Commercial Decrees, but she was unable to do so. She supports her Government by a foreign trade, and a non-intercourse with England means bankruptcy for her. The French invasion (1812) was produced mainly by the inability of Alexander to keep to these engagements. Yet Russia was not too desirous of destroying Napoleon until the moment had arrived when she should be able to push troops into Europe and assert her claims. Marshal Kutusoff, the Russian Commander-in-Chief, accordingly protected the French Emperor (notably at Krasnoi), during his disastrous retreat across the snows of Russia. The reason was, that the Government of St. Petersburg feared England's maritime power, or, as Kutusoff put it, "I am by no means sure that the total destruction of the Emperor Napoleon and his army would be such a benefit to the world. His succession would not fall to Russia, or any other Continental power, but to that which already commands the sea, and whose dominion would then be intolerable."²

The final overthrow of Napoleon, in 1815, was effected by the steady advance of the Continent on France, wasted by so many wars,

¹ Bain's "Wars of the French Revolution," vol. i, p. 455.

² "The French Invasion of Russia," by Sir Robert Wilson, pp. 234, 271. &c.

and enfeebled by commercial losses; and, in 1815, the Congress of Vienna finally closed the long period of hostility.

The naval strength of Great Britain had then exhibited itself by attacks on the commerce of the enemy, which forced the inferior fleets of the enemy out of their harbours to protect their convoys; and the general action of England by sea seems to have been, that crowds of privateers and other ships opposed the hostile cruisers, and cut off the enemy's trade in every corner of the globe, while the larger ships of war blockaded the enemy's fleets, and attacked them as they sought to escape, in order to protect and escort their harassed commerce. This naval strength was England's chief power; for her armies, good as they have always been, have seldom been numerous enough to effect very decisive military operations properly so called. The maritime preponderance which we still have—did we only restore our rights by sea—is now even more than it was, when Talleyrand said to the English Ambassador, in 1806, "You are the rulers of the ocean; your naval forces are equal to those of all the Sovereigns of the world united. We are a great Continental Power, but there are many who equal our power by land, and your marine preponderance will always place our commerce at the mercy of your squadrons immediately after your declaring war." In fact, no nation has any weapon long enough to reach us, but we can destroy in our enemy the means of making war, and can paralyse his Government by ruin.

In 1854 we were again at war; but this time, having waived our maritime rights, the war bore quite another character. In 1812, we declared that the maxim, "free ships, free goods," would make Great Britain "surrender all the advantages of her naval superiority," and this prediction was fully verified; for, having given this immunity to the neutral flag, there was little or no naval warfare. It cannot be said that the ships of England could not have harmed Russia, since she is a military power, and her fleets are weak; for had the rights been maintained, her commerce would have been exposed, and as this is of the most vital consequence to her, her men of war would have been forced out of their harbours to its protection. Had she then determined to resist, which is unlikely, a maritime war, defrayed by Russia, would have decided the quarrel, without expense, and without the loss of so many gallant men who fell before Sebastopol. A statement was made in the House of Commons (February 20th, 1855), which shows the importance of her foreign commerce to Russia, and the ease with which we might have coerced her by attacking it:—"At the outbreak of the war, the rouble fell from par, 38 pence, to 32 pence, and it was confidently anticipated that before the war had lasted many months, it would fall much lower; that a serious financial crisis would overtake the Emperor; that ruin and poverty would fall upon the landowners, and that national bankruptcy must ensue. . . . That our efforts have not met with the desired result is certain, but indeed the reverse. So far from our having blockaded the principal ports, the exports from that empire have been greater than ever. The whole case may be summed up in the statement that Russian commerce has not been injured, that

"10,000,000*l.* of English money, instead of 11,000,000*l.*, the ordinary amount, has been paid to her, and that the rouble, which had declined to 32 pence, has risen to par."

Again, of what service was the French Navy to her when struggling for existence with Germany in 1870-71? France had spent millions on her fleets, and much enemy's wealth was within her reach, yet, owing to the Declaration of Paris, she was unable to use her marine—German property going safe under a Neutral Flag,—and was debarred from capturing that wealth, which permitted her rival to overrun one-third of her territory, and afterwards to extract from her 200,000,000*l.* of her money.

The Declaration of Paris has, therefore, destroyed naval action when war is being carried on against a purely military power. It would also make us lose our important carrying trade should we go to war, under its provisions, with a maritime country. This last proposition is so plain, that it is unnecessary to go into it here; but I would remind you that the loss of shipping is not an ordinary *commercial* loss; should our vessels leave us, our sailors would accompany them, and England would entirely lose her maritime character.

A very important question now presents itself. If Great Britain has yielded up her naval rights, on what else does she depend for defence? The whole of the Continent is armed to the teeth, England, the possessor of India, has vital interests which cannot permit her to separate herself from the struggles which are preparing, and which now seem to be reaching a crisis. The question is rising daily in importance; many things have been suggested, much has been tried, but have we succeeded? Do not let us delude ourselves into the notion, that we have not yet seriously tried to make ourselves a military people; for many years we have neglected naval weapons, we have forced ourselves to believe that national strength only consists in organized armies, we have seen and anxiously marked the processes by which Russia, Germany, Austria, and France have converted their huge masses of men into well-equipped forces, we have recognised the danger of our defenceless position, we have struggled hard to copy the Continent, and to provide ourselves with like armies, and yet, notwithstanding all our efforts, we are totally unable to compete with them, or to raise anything that would sufficiently vindicate our interests. The reason of this failure is simple; military power does not constitute the only defence of a nation, and it is an impossibility to draw the same resources out of Great Britain as those that can be drawn out of Germany or Russia, for the latter are essentially military states, the former is not.

To see this, it is only necessary to consider the habits and the employments of the people who compose different countries. Shepherd and agricultural races can devote more attention to military pursuits, than a commercial and manufacturing people; 1st, because they are more easily localized, and 2ndly, because their time is not so valuable. The former live scattered over the country, they are easily united in districts, for training or mobilisation; the latter huddle together in large towns, they continually shift their residence,

and it is very difficult to collect them for military purposes. The splendid organization of Germany, which arms at a moment the whole youth of the empire, from whose villages issue fractions of companies, and in whose provinces are assembled the perfectly equipped Army Corps, is quite inapplicable to this nation, where country labour only draws just sufficient workmen for its own necessities, and where the remainder crowd into manufacturing districts, and become lost in the circles of commercial enterprise. Again, the time of those who compose shepherd and agricultural races is not so much employed, as that of men engaged in trade as artisans; and the difficulties of forming the inhabitants into soldiers are far greater in the latter case than in the former. I would refer you to the very lucid explanations on this head given by Adam Smith, in his "Wealth of Nations" (Book 5, Chap. I, Part I). The time of English workmen is most valuable and expensive, and hard as it is for us to *show* on paper a force of under half a million, as our war strength, against the continental nations who each can show over a million, we should find it yet harder to *use* half so large a proportion of our estimated figures, as they could of theirs. It is our national characteristics which prevent us from being a military state (except, of course, as far as the excellence goes, which our troops have always exhibited), and to seek for the origin of our strength, we must not look to the masses of disciplined men which modern warfare requires, but to maritime power, as has been already indicated.

The Central Asian question gives great anxiety, yet when we understand our strength, the difficulty disappears. Sir John McNeill said that "the right of search which constitutes the maritime power of England, was a prudential weapon placed in the hand of England for the coercion of Russia." Mr. Cobden also said, "It is clear that nature itself has doomed Russia to a condition of abject and prostrate subjection to the will of the maritime powers." Both these statesmen here show that the exercise of naval rights is the way to check Russia. All danger fades away in India, from a Muscovite invasion, if England will only restore her power and re-establish her cruisers; the threat of war will then be quite sufficient to make the Government of St. Petersburg think seriously of the risk which it would run, by provoking our hostility.

There are some who, while they perceive the danger we are in, owing to the Declaration of Paris, console themselves with the idea that we shall tear it up the very moment we go to war. This I believe to be neither just, wise, nor likely. England has been at peace in Europe since 1856, and, therefore, during all the wars which have occurred since then, she has been a neutral; as such she has carried the goods of those belligerents who had not sufficient maritime power to defend their own trade, and consequently she has hitherto seen nothing but the sweets of the Declaration of Paris, and to the cost of those naval belligerents who found their enemy's goods thus protected. Is it right or honest that she should connive at this injustice, while she reaps advantage therefrom, and propose to upset it, directly it begins to hurt her?

But again, the military preponderance of Europe is not now—as it was in the beginning of the century—in the possession of one empire; it is shared by several powers, and is therefore divided. Yet, notwithstanding, England has not the influence she used to exercise, and our interests are suffering thereby; the reason is plain, having done away with our principal national weapon, we have not the strength to assert the independent policy which is best suited to our national welfare. Is it, then, wise to neglect this weapon (and to be powerless) in peace time? Is it wise to drift into whatever the military despotism of Europe may wish to impose upon us? How different is this supposition,—of thinking that we shall, on the eve of a war, abolish the Declaration of Paris,—from that true wisdom which is contained in the dispatch from Lord Heytesbury to Lord Cornwallis, British Plenipotentiary at Amiens, 1st January, 1802: “His Majesty will never consent to place out of his hands, in a Treaty of Peace, those means which may be necessary for the security of his dominions in time of war.” And lastly, it is very apparent that the only reason why we have yielded our maritime rights, has been that the country has not examined the question at all; our long cherished traditions could never have been discarded under any other conditions. Who, then, will affirm that if we hesitate and neglect the subject *now*, we shall be able to abolish the Declaration of Paris when the confusion of a war overtakes us? We should *then* be seeking for allies, and those nations whose interests are opposed to ours, would engage neutrals to make us hold to what they would pretend to consider our engagements. Threatened by foes, threatened by neutrals, and opposed by a country who is ignorant of the value of its rights, what Government could carry out this change on the brink of a war? The Crimean War was conducted without naval rights; the Danes were dismembered in 1864, yet they did not tear up the Declaration of Paris, nor bring their strength by sea to help them in the war which mutilated their national power; and in 1870–71 the French held themselves bound to it. In fact, every war since 1854 has been fought *without* maritime rights, notwithstanding the fearful disasters which have befallen nations who neglected them; whoever, then, sees that the Declaration of Paris is *not* binding on us, and that it is dangerous to the country, cannot for a moment quiet himself with the supposition, that we should abolish it in the event of a war; the testimony of the history of the last twenty-two years entirely annihilates that illusion.

Now, in full peace, is the only moment; we have every right to break through the Declaration of Paris, as it is illegal and hostile to our natural rights, which no compact—even were this a compact, which is not the case—can destroy. By doing so now, we should show that we were influenced by principles of international justice, and not by feelings of self-interest, and as such, should receive the co-operation and applause of all honest men. If we do so we shall restore our vast power, and re-establish the influence we seem to have lost, and thus give the best interpretation to the saying:—

“If you wish for peace, be ready for war.”

The CHAIRMAN: Ladies and Gentlemen. I need not tell you that this subject is one of very great interest, not only in a naval but in a national point of view, and we may also say in a military point of view. I am very glad that one of my profession has taken up the sister profession, and shown the interest he takes in it. I am sure there are a great many here who will be very glad to enter to a certain extent into the discussion, and we shall be very glad to hear them.

The EARL OF DENBIGH: I have some hesitation in speaking on this occasion, when there are so many Officers present who would speak to so much more purpose than I could upon this most important question; but as it is one in which I have taken very great interest, and on which I have on two occasions spoken in my place in Parliament, I cannot refrain from expressing my appreciation of the admirable way in which Mr. Ross has brought this subject forward. His treatment of it has been so exhaustive that it leaves scarcely anything to be said. He has particularly touched upon one question which I think has not been touched upon before. When I asked the question in the House of Lords whether the Declaration had ever been ratified by Her Majesty, I drew from the Government that there was no ratification of any sort or kind by Parliament or by the Crown; but I have been met by the answer that as we have been silent now for twenty years, we have, as it were, condoned it, and that we are in that awkward position that we could not withdraw from it without dishonour. It has also been urged that as there is a great deal of loose gunpowder lying about in the world just now, this is not exactly the moment when we ought to take the initiative and withdraw from this position. I cannot say that I concur in this view. I think it is precisely because there is so much gunpowder lying about in the world that we ought to do so. We have already taken one step which has shown that we are not afraid of standing by ourselves, and we have therefore received the approbation, I believe, of the rest of Europe. We are, therefore, in the position at this moment of being able to say, "We have taken a false step, we admit the falseness of the step. We have forfeited thereby in a thoughtless moment our natural rights, of which no one could deprive us, and of which we had no right to deprive ourselves by any act whatever; and therefore, as an honourable nation, we desire in this time of peace, when we cannot be accused of any wish of aggrandisement, to withdraw from our false position." I believe that this would put us in a position in which we could hold our own, and I might even say dictate to the world. There was a clap-trap sort of answer offered to me, which—

The CHAIRMAN: I hope we may a little avoid anything that tends to clash with the proceedings of Parliament. We are a military and a naval assembly.

The EARL OF DENBIGH: This touches the question as to the humanitarian principle. One reply made to me was that as we had given up attacking private property on land, we were therefore not to attack private property on sea. That has been touched upon most admirably by Mr. Ross, and it is one which naturally strikes people on the first consideration of the matter. The other is the humanitarian question as to whether it is right to impoverish so many people at once, as would be the case if we stopped the whole commerce of a nation. That is taking a very improper view of the question, because surely it is much more humane to take a person's money than his life; to impoverish some thousands of people than to blow them into space by all these diabolical engines that we have now prepared for that purpose. I am very loth to take up your time, but I cannot help thanking Mr. Ross for having brought forward these two points which were given as answers to me when I dealt with the question. I hope they will be thoroughly ventilated in the further consideration of this question.

Mr. STIRLING LACON: I, following the noble Lord, may say, that although this question has not received the ratification of Her Majesty, I believe the declaration of Paris was signed in Paris by our Ambassador, and has also received the sanction of both Houses of Parliament. (No, no.) I may be wrong, but my reason for asserting this is, in order that we may put the fullest information upon this subject before our members who will read this discussion. I have been informed it has received the sanction of both Houses of Parliament, although it has not received the ratification of Her Majesty.¹

¹ "The Treaty of Paris was approved by the House of Commons without a

Mr. BUTLER-JOHNSTONE, M.P.: If I may be allowed to answer the question, the Declaration of Paris has never received ratification. First of all, it was never signed by the command or mandate of the Crown. It has never been ratified by the Sovereign, and it has never been approved by either House of Parliament. From the very nature of the case it could not receive the ratification of the Crown, nor the approval of either House of Parliament; and for this reason:—It is not a treaty, but a simple declaration; a declaration indeed far more sweeping than a treaty, because a treaty is a compact between different nations, whereas this is a declaration, which is to bind the country in future wars with all nations, and with reference to all neutral nations. The object of the Declaration of Paris, as stated in the 23rd Protocol of the Conference, was to attain uniformity of maritime law, whereas formerly there was a difference of opinion and of practice between nations. Therefore, until all the nations of Europe, and also of the other continent, had agreed to this Declaration of Paris, it was premature at any rate for any of the nations who had signed that declaration to ratify it either through the Sovereign or through Parliament. When that declaration became known in this country, there was such an indignation among those who knew what the meaning of it was, that motions were made in both Houses of Parliament, by Lord Colchester in the House of Lords, and by several members, especially Mr. Phillimore in the House of Commons. Lord Colchester was supported by Lord Derby, Lord Carnarvon, Lord Hardwicke, Lord Albermarle, and several other members; in fact, by the general feeling of independent members on both sides of the House. But Lord Palmerston was the triumphant Minister of a triumphant country, at the head of an overwhelming majority, and it was impossible, in the teeth of that majority, and in the teeth of the general jubilation which took place upon peace being made, to carry motions condemnatory of the Government. Therefore Parliament has not actually condemned it, but no English minister has ever dared to come forward, and ask the ratification of Parliament for this declaration. Lord Denbigh has said, that there has been silence on the part of Parliament and of the Government since the Declara-

“division, and on the 22nd of May following, a motion was brought forward by Lord Colchester in the House of Lords condemning the code of maritime law contained in the declaration appended to the treaty, and especially that article which exempted enemies' goods from capture, while under a neutral flag. The motion of Lord Colchester was rejected by a majority of 54.”

When the treaty was laid before Parliament, it gave rise to animated debates in both Houses. On the 6th of May, Mr. Robert Phillimore, in the House of Commons, called attention to the subject in an able and exhaustive speech, in the course of which he expressed his “irrepressible conviction of the great sacrifice of maritime rights which Great Britain had already made, and was still further making by the declaration contained in this Treaty.” He further said, “that it was because he thought that the abandonment of that right would prolong and not diminish the horrors of war, that he was opposed to it;” and he concluded in these words:—“He could not help thinking that a right had been parted with, of the value and importance of which the country was not aware, and that we were now under an obligation to admit, in the face of the whole world, a principle which it was most inexpedient to part with, but which we had no longer the right to enforce;” and in the House of Lords, on the 22nd of May, the Earl of Derby, after a masterly review of the arguments adduced on either side, concluded as follows:—“Suppose, which God forbid! that a war should arise between this country and France, what means have you of opposing her, except by closing her up hermetically, and stopping her commerce? Well, what are you to do? You cannot blockade the whole coast of France; but you can practically prevent her from sending out one single bale of merchandise—your new law permitting French goods to go with impunity on board neutral vessels comes into operation; you have no blockade. France gives up her whole commercial marine; she makes her vessels into vessels of war; she has seamen to man them, and before your very face she carries on her whole commerce under the Prussian or American flag. Your power is gone; your right arm is cut off; your only means of defence are abandoned, and abandoned too at the suggestion of France. If I stood alone I would support the resolution of my

tion of Paris. If there had been silence we should have been in a far better position than we are now; but in consequence of the declaration, and the protocol which preceded it, there have been negotiations with something like thirty or forty nations asking them to sign the declaration. Fortunate it is indeed for us that among the nations to whom we went cringing and begging to join with us in signing away our natural weapons, and our supremacy at sea, and the defences of our country, two important naval nations, viz., Spain and the United States, have, as a matter of fact, refused to do so. In the face of Spain and the United States, what does the recognition given to it by nations like Switzerland or Bavaria signify? The fact is, Spain and the United States have saved us, and now we are able to say, "as uniformity, which was your object, has never been obtained, we will recede from this one-sided declaration, which is aimed simply and solely at maritime nations, and especially at the maritime superiority of England." Other nations who signed it say this,—"We will consent not to make war upon sea where we are weak, but only upon land, where we are strong," whereas the meaning of England signing it was,—"We will consent to make war upon land, where we are weak, and not upon the sea, where we are strong, and where hitherto we have been supreme." A declaration more fatal, because it was absolutely destructive, even of the existence of this country, I do not believe it is possible to conceive. There are one or two points in this lecture which I wish to mention. Certainly, as Sir William Codrington has said, I do not know any augury so happy as that it should not have been a naval Officer coming forward, who might be open to the suspicion of asking for prize money, and protesting against prize money being taken from the navy; but that it is a military man, who knows the defence of the country means war equally upon land and sea, who comes forward and points out in detail where this miserable declaration cuts the ground from under our feet. In 1856, we had been attempting to transform ourselves from a naval into a military nation, and from a naval nation of the first strength into a military nation of third or fourth-rate strength. They talk of standing armies—why, there is no such thing as a standing army now in the

"noble friend. I would divide the House upon the question. I would give to every one of your Lordships the power of recording your opinion as to the wisdom and the safety of these proceedings. But, for my part, I solemnly protest, as derogatory to the country, as inconsistent with its dearest interests, as fraught with danger to its future greatness and power, aye, to its future safety; I protest against the abandonment of rights involved in that which, with all respect for his personal qualities, I cannot but characterise as the miserable Clarendon capitulation of Paris."

And the writer of the pamphlet from which the above quotations are made, says, "The practical question then remains, what is to be done in the event of our being engaged in a war with any great naval Power? Are we to adhere to the Paris declaration, or are we to resort, in spite of all the consequences, to the practice of former times? We believe we may venture, without presumption, to answer this important question. We believe that on the very first occasion in which we are involved in a serious naval war, the Paris declaration will be cast aside, as other declarations of a similar kind have been before it. We shall be compelled, from sheer necessity, to resume that legitimate weapon of offence which we have so recklessly thrown away. It may be said that we did not resort to it during the Russian war. But that is not an example in point, for there was then no naval contest, the sea from first to last being in possession of the Allies." "Of the perilous character of such a step it is almost superfluous to speak. It might involve us in hostilities with every one of the Powers that were parties to the Paris declaration. It might lead to the formation of a third armed neutrality more formidable than either of its predecessors. Even if it did not lead to active measures of resistance, it would certainly excite against us the cordial ill-will of every naval Power in Europe. We should, at the very least, be charged with a most flagrant breach of faith. But in the case supposed, we should have no alternative but to encounter all these perils, and brave all accusations, or to resign without a struggle, our maritime ascendancy."—"Our Maritime Rights," 1860, by John Hosack, of the Middle Temple, Barrister-at-Law.—W. S. L.

old sense of the term; there are nations standing in arms with their whole manhood enlisted in their army and reserves, and what of England? England, with her little brave army, that has in history done such marvellous acts, ready to a man to sacrifice their lives, what can a corps d'armée, like the English army, do against the military standing nations of the world? Why the thing is impossible, and for this reason. We are a commercial and manufacturing nation, instead of an agricultural nation like others; and what is the meaning of being a commercial and a manufacturing nation? It is that our skilled workmen, earning five shillings to ten shillings a-day, cannot afford to go and fight in the ranks of an army where they are only paid one shilling. Our state of civilization makes it impossible to have recourse to conscription without something like a revolution in this country, and a nation having an army without conscription cannot by any possibility hold its own against nations having recourse to conscription. The consequence is, we are left essentially a naval nation, the army of course co-operating in its own sphere with the navy, and this Declaration of Paris absolutely destroys that naval superiority. If the country will only comprehend it, and nothing can make the country comprehend it so well as lectures like this—if once the nation comprehends this, I make no doubt that it will take the matter into its own hands, and will, in time of peace, which is the only honourable time to do it—it would be perfectly dishonourable to do it in time of war—now in time of peace, the nation will insist upon the abrogation of that declaration.

My friend, Lord Stanley, reminds me there is a point about privateering. The fact is, we were unfortunately led, during the American struggle, to look upon a pirate, like the "Alabama" was, as a privateer, and consequently we are led to look upon privateers as pirates. Now, what is war? War is a declaration of death against your enemy for doing you injustice. Other nations have no right to send their sons to fight in a quarrel which is not their own. If you go and send men to fight for another nation, that is piracy. The "Alabama" was purely and simply a pirate; she was fitted out and equipped in English ports in a quarrel which was not England's. But the question of privateers is very different; it is a mere means of warfare. Whether you send commissioned Officers in vessels that you hire, belonging to the merchant service, or whether you give letters of marque to private individuals, is a mere matter of detail. But the question of privateers has little to do with the Declaration of Paris. The question of the flag covering the cargo is a question of the object of war itself. What the Declaration of Paris did, was to allow neutral bottoms to carry enemy's goods, and neutral bottoms carrying enemy's goods means that England has no power of compulsion over her enemy's commerce, which is the natural weapon of England. Go to war with any nation you choose—France—you are liable to invasion from her. What compulsion can you put upon France? Stopping her commerce. Go to war with America. She can invade Canada with overwhelming forces. What compulsion have you, except by putting compulsion upon her commerce? You guaranteed Belgium. I do not know anything so monstrously presumptuous as that guarantee, if you do away with the single force by which you can compel your enemy to do justice, viz., compelling him on the sea, where your strength lies, and in the commerce which you can take away from him. This cannot but be a very important subject to Englishmen, and the one thing necessary is to enlighten them upon the subject, and nothing can do that better than lectures, such as that which Captain Ross has given us to-day.

MR. MARX: I should like to draw attention to the power given to a ship-of-war and that given to a privateer. A ship-of-war has a commission to "sink, burn, and destroy;" a privateer has no such commission. I am speaking in reference to the "Alabama" claims, and also to do away, in some measure, with some of the objections and prejudices against privateers. Their commission is to capture and bring into port, for adjudication; they have no right to sink, or burn, or destroy.

Commander CHRYNE, R.N.: Having listened with attention to the lecture, I venture to suggest, if agreeable to Lord Denbigh and the Committee and Lieutenant Ross, that Lieutenant Ross's lecture should be placed at the disposal of the Council of the Lecturers' Association. Lord William Lennox is Vice-President of that association. I am on the Council myself, and I think, if it is not objectionable, I might lay

copies of Lieutenant Ross's lecture before the association. I think it would then be taken up by the lecturers throughout the country, and when the constituencies throughout the country get hold of the main points of the lecture, it might be made a crucial question at every election, so that we might be able to extract a pledge —

The CHAIRMAN : We will not go into the political part, if you please.

Captain CHEYNE : I will drop that point. At all events, I think it would be a means of spreading it universally throughout the country, and I am certain the Council of the Lecturers' Association would take it up. I have already sent the programme of the Committee to the organ of that association, called the *Lecturers' Institute*, a newspaper published monthly, and I am sure it will be well received. And, if I am authorised to do what I now suggest, I think it would be the means of enlightening the country on this important, nay, perhaps vital subject.

The CHAIRMAN : It is the rule of the Institution that the lecture becomes the property of the Institution, and as we are here, not as a Council, but merely as a general meeting, we cannot deal with this matter. I will take care that the proposal shall be put before the Council, in order that it may be considered.

Lord STANLEY OF ALDERLEY : I desire to congratulate the Institution upon the lecture that has just been read ; and, as a sign of the progress made in this direction, it is very remarkable that no objection has been made to any of the statements contained in the lecture.

General CAVANAGH : I should like to refer to one remark which was made by the lecturer, namely, as to the effect that the loss of shipping caused by the superiority of a nation with which another nation may be at war, has upon the future prosperity of the weaker power, owing to the seamen manning the ships. The "Alabama" happened to be in the Eastern Seas during the time I was Governor of the Straits Settlements, and the consequence was, the whole of the American commerce was completely paralysed. Several American vessels were lying in the harbour of Singapore, unable to leave. The Americans, as a nation, were perhaps too proud to try and get by a side-wind what they could not secure by their naval superiority. Hence, they did not attempt to nominally transfer their vessels to the British flag, and the result was, they were obliged to sell them on unfavourable terms. From that date, I believe, we may trace the decline of American commerce and of its commercial marine. Subsequently, when a war was supposed likely to break out between France and Germany, the Germans adopted another course. They immediately applied for letters of naturalization. Had these been issued, they would have sailed under British colours, and their commerce would have been saved. I cannot say that I agreed to the arrangement. I considered that, as they had not in time of peace expressed any intention of applying for letters of naturalization, I was not justified in giving them in time of war, and I consequently felt myself compelled to refuse their request. I think this shows the effect that the Declaration of Paris has upon commerce in time of war. Had I granted these letters of naturalization, the German commerce would have been carried on, in their own vessels, perfectly uninterrupted, and without Germany suffering, in the slightest degree, from the superiority of the French Navy.

Major POORE, late 8th Hussars : The American mercantile marine has not yet recovered from the effects of the "Alabama." America also furnishes, with another episode, an example of naval action. Paul Jones, with a few ships (three, I believe) spread a panic over the whole of this country, coming suddenly and acting on the coast and shipping.

As we stand, unless we make the sea our defence, we become powerless, as the sea, unless used as a defence, becomes an easy high road for any nation to attack us. Again, the sea, from the nature of our possessions, holding as we do nearly all the best harbours in all quarters of the globe, gives us a base of operations in every part of the world simultaneously.

This matter of the possession of harbours is one of the distinguishing points between the action of lawful cruisers or privateers and the "Alabama." The Southern States, having free possession of no port, had nowhere whence they could lawfully equip a cruiser or run prizes to, and though the "Alabama," &c., is illustrative of part of the subject, the Southern States were not in the position that

we should be, possessing, as we do, ports in all parts of the world, which gives us the advantage of short and convenient distances to run our prizes to, in comparison to other nations under similar circumstances, giving us, in time of war, a base of naval operations in every quarter of the globe, which powerful position, if understood and properly acted on, can hardly be overrated.

Captain CARMICHAEL, 5th Lancers: We ought to be much obliged to Mr. Ross-of-Bladensburg for bringing forward this question; and I agree with what previous speakers have said, that such a lecture as this comes more gracefully from a soldier than from a naval Officer. We have latterly, and especially at this Institution, been inclined to aggrandize the Army, trying to make it popular, and, to a certain extent, overshadow the Navy. I, as a soldier, wish to point out why we can never be a great military nation in Europe. In Asia we may be, but in Europe we never can. The area of England is so small as compared with other countries, that, as population increases, they daily become, as military nations, more powerful in proportion to us. But the naval power of a nation is dependent on the extent of its coast—a fixed quantity, which cannot alter—and, since we have a longer coast line than other continental powers, we must ever remain superior as a maritime nation. I think, also, our people—accustomed to free institutions—will never endure that internal interference, by which alone the enormous Armies on the continent are kept up. But, although our patience is short, we have a very long purse, and I believe we could endure an amount of taxation that would drive, even the conscript nations of the continent, into rebellion; and the way in which we can best spend our money is on the Navy, in those monster guns, and those ironclad ships, whose enormous cost other nations are less able to afford.

Captain J. C. WILSON, R.N.: I should like to say a few words on this very interesting lecture by Lieut. Ross. I will repeat almost what Captain Carmichael has already said. It has come much more gracefully from a military Officer than it would from a naval Officer, because we might be accused of pleading for ourselves. Self-interest might have induced many men to work up this subject, whereas he and also several military Officers who have spoken, particularly Captain Carmichael, on principle advocated our maritime rights, besides referring to the profession to which I have the honour to belong in the most generous terms, showing that they are quite as ready to advocate anything connected with it as readily as they would matters more immediately belonging to their own profession. However, this is really and truly not primarily a professional, but a national question, a question of such vital importance that no one can speak too strongly upon it. And perhaps, in passing, I may say the only objection I have to Mr. Ross's admirable paper is, that it has been too exhaustive. It has left nothing for any one else to say. He has so gone into the question, and given us the history of everything touching it so thoroughly, that he has really left nothing unsaid. That his paper has been very conclusive I think we may almost at this early stage of the discussion take for granted, from the fact that we have not yet heard one dissenting voice. Every one has been in favour of his views. I only regret that we have not had some person here (though possibly some one may yet rise) who will take up the opposite side, and advocate the ratification of the Declaration of Paris. What Mr. Ross has most clearly laid before us is, that the trade of a country is the sinews of war, and that without trade, war cannot be prosecuted, and if it is entered into, and the trade of the country is cut off, in a very short space of time it must succumb. I think no more telling paragraph is to be found in his paper than that in which he quotes from a speech made in Parliament, and where he shows that the rouble in Russia fell 20 per cent. at the declaration of war, but immediately rose again to par when it was discovered that their trade was to pass undisturbed under neutral flags. We say the Funds are the pulse of the country; if so, it shows that the Russians very soon recovered from what they felt to be a severe shock. If the Funds of this country fell 20 per cent., most Englishmen would consider we were in a very critical condition. Both Captain Carmichael and the gallant lecturer pointed out that a great deal more attention has been lately given in this country to military matters than to naval. There can be no doubt that such has been the case. I am not going to enlarge upon the drawbacks of the Navy at the present time, but I may say the same attention has not been given to the Navy which ought to have been,

and that it even now, at this critical time in the history of England, is not in the state it should be. Everything they can send out of the dockyards has been commissioned for the Mediterranean, and to save the country from annihilation, another ship could not be ready under three months. I ask you all whether such is a state for the country to be in with an Eastern Question on us? It is not, as a rule, in the material of war we shall ever fail, with our enormous factories, our iron works, and our coal, we can never run short of material. Besides, our coal mines, our iron shipping, and other interests are so well represented in the House of Commons that the *matériel* will never be neglected; but in the *personnel* of the Navy we are always far below par. On the Merchant Service of this country we must rely for our men; sooner or later we must fall back upon it. We have got now a system of rearing our own men which does very well for peace, but for war purposes it cannot stand. We have a small reserve, which at the best has never been tried, but if what we read every day, and what we have heard in this theatre lately, be true, we have been living ever since the abolition of apprentices upon capital, using up men without taking the trouble to rear others in their place.

The CHAIRMAN: You are getting a little beyond the point.

Captain WILSON: It is simply touching on what the gallant lecturer says. I say we have no resources to fall back upon in time of war. Our maritime forces have been steadily neglected. That is what I wish to enforce.

The question of the flag covering goods in neutrals has been so clearly put by others that I will only touch upon it in the way it appears to myself. The men will follow the ships, as all history shows, especially the late American war, where the commerce of that country disappeared, and with it the seamen, so that they could not man their ships of war. Their navy was increased from some 50 ships to 600, but they had no men, no native sailors, because they had followed their ships. If our commerce is transferred to neutrals, the men will surely go with the ships, and we shall not get seamen when we require them for war. There is another view to be taken of it. Napoleon said he only required the command of the Channel fifteen days to invade England. If he could do it in fifteen days with sailing vessels, I suppose forty-eight hours would be enough for one of the great military powers to do so now, if they only had command of the Channel. But the thing they have always been wanting in, is transport; but if the bulk of our ships are transferred to neutrals, surely it is but a step from them to our enemies. From a neutral it would be a very easy thing to get ships, and you might be invaded by means of your own vessels. The idea may be far-fetched, but it is quite possible. As has been shown, the stoppage of the export of raw material from Russia would probably have brought the Crimean war to an end much quicker than it was, and so long as we have the command of the sea, and can use our rights on it, we can always keep her aggressive policy in check. There is just one point in which I may say I do not quite go with the lecturer, and that is on the question of privateers, although I have heard a good deal said to-day in favour of them. I do not think that war is a thing into which private speculation should be allowed to enter. I think all cruisers, like other machines of war should be under Government, and fly the Government flag. I do not mean to say by that I would not utilise the Merchant Navy, and I also think it would be a very good thing to utilise private enterprise to a considerable extent, for it would be quite possible to do so without recurring again to privateers. For, instance, on shore, if you use volunteers, you would place them under military law and discipline; in the same way every vessel that calls herself a ship of war should be under Government. You might treat ships very much in the same way as in the Russian war you treated regiments. You give certain Officers the power to raise regiments and command them; in the same way you might take picked Officers from the Merchant Service or Royal Navy, and give them the command of ships they could fit out and man, but I object to privateers in the ordinary sense of the term. Besides which, I almost doubt whether as a great commercial nation, we should gain at all by employing privateers. I observed in the *Contemporary Review* of last April, in an admirable article, written by Mr. Brassey, a curious fact, viz., that between the 1st February, 1793, and the 31st December, 1795, the French took from us 2,095 merchantmen, whilst in the same time we only took 319 vessels, therefore privateering appears to have been rather against us than

in our favour. However, this does not alter the main question at all, it is merely a matter of detail. I will not say any more, excepting to express the very great obligation we are under to Mr. Ross for having taken up a question which is so deeply interesting to all Englishmen, but especially so to us belonging to the Navy.

Captain SCOTT, R.N.: I think the Army men, as a rule, push the naval men forward, and if the naval men do not go forward fast enough, it is their own fault. In a recent paper by Mr. Brassey, he mentions that Admiral Porter states that in a war with England the United States in the course of a very few months would drive the English trade off the seas, so that it is very evident that they have no intention of agreeing to the Declaration of Paris. The United States might possibly hereafter join in alliance with one of our present friends with whom we had been, say, some months at war. Our friend, like ourselves, agreed to the Declaration of Paris, but the United States did not, and hence we should be put in a very awkward position, and might suffer serious injury before being prepared for the new combination. There is no doubt that our mercantile marine is a very great source of strength, though I am sorry to say that latterly measures have been taken which would not make it so, and we have no organization for developing its power; but as I am going to enter into the whole question shortly in a paper I am preparing to read at this Institution, I will say no more about it at present. When we see so many members of Parliament take up the matter, I have no doubt it will be brought before it and taken up by the country. Lord Denbigh has on several occasions assisted naval men and measures, and I hope he will not fail to bring this matter forward again, and no doubt it will be then successfully carried through the Legislature.

Mr. C. D. COLLET: With regard to the question of privateering, I beg to call Captain Wilson's attention to one point, that in war there is always a difficulty. Even in such a war as the old French war, when the Government and people were together, there is always a difficulty from the routine which the Government exercises, and for that purpose it is absolutely necessary that the old system of privateering, by which private individuals should not be debarred from exercising their patriotic inclinations, should be continued. The regulations on that subject are very strict. Every privateer has to give security in a large sum of money that he will conform to the law of nations, and if he violates it—if, for instance, he ill-uses a neutral, that neutral has the opportunity of suing him in a court of law. The thing has been done, and the privateer has had to give damages. But the question is altogether separate from that of the flag covering the cargo, and so much so that Lord Clarendon himself inspired an article, in which he showed that if we were at war with America, the Declaration of Paris would not prevent us from using privateers. The point of difference is this: the neutral really does get a benefit from carrying on the trade of the enemy, and therefore, if we did really make a treaty with a neutral to permit him to do so, we should be bound in honour to carry it out. But it makes no difference whatever to the neutral whether the goods of the enemy are taken by a privateer or by a Queen's ship, and therefore that portion of the Declaration of Paris falls through for want of meaning. In the war with Russia our enemy was allowed to have many advantages. Every sailor in that war was under a distinct Government Officer, and of course could only do that which he was ordered to do. Of course, a privateer must act independently, and that independence is quite necessary if we are to continue the patriotic exertions of our own people.

The CHAIRMAN: There is no doubt the discussion that has taken place has shown the very great interest that every one, both from a naval, military, and national point of view, takes in this important question. One thing I may say as a military man: it was remarked that we can never be a great military power on the Continent. That is rather a strong expression to let pass without comment when we know that Marlborough fought his battles upon the Continent, and Wellington did the same. I think those are rather strong cases against the positive statement which has been made.

Mr. Ross: I am deeply sensible of all the kind things which have been said of me to-day, a great deal more than I deserve. I think the discussion has been so one-sided, we may say, that I really have very little to add to what has been already remarked. I have only a few words to observe upon what Captain Wilson

said about privateers. I think the great objection raised against privateers has been more on account of their name than anything else. People dislike the word. The Germans during the late war wished to institute privateers, and they called it the "Voluntary Marine," but it was exactly the same thing.¹ The Officer in command of the ship was to be a Crown Officer, in exactly the same way as the Officer in command of a privateer is—for the time being—a Crown Officer; that is, during the war he has a commission from the Sovereign, constituting his ship for the time being a legitimate cruiser. The difference is only in the name. The great abuse that privateers have had, dates principally from the time when England and Spain, in the beginning of the last century, were engaged in a sort of chronic war in America, and in which a great deal of buccaneering went on under the name of privateers; but I do not think, in the legitimate employment of privateers we can find any fault. Then, with regard to what has been said that we should lose by restoring privateers, I think it is the other way. I saw Mr. Brassey's paper, and, if I remember rightly, his numbers were something like 2,000, instead of 1,000; that is, that we lost 2,000 ships, while the French only lost 300, up to December, 1795. The losing of merchantmen, however, does not altogether measure the loss of property. A great deal of French property at that time went under other flags, which was captured, although during the first part of the war, the English, on account of some Orders in Council, allowed neutrals to carry a great deal of enemy's property, which was therefore not confiscated. This, I think, quite shows how it was that we lost so many *merchantmen* in comparison with the enemy; but as far as the loss of *property* went, it was quite the other way: the French were entirely crippled in the first part of the war by their losses in actual money.

Captain WILSON: So long as the privateers are under the Crown, I have no objection to them at all.

Admiral Sir BROOKE MIDDLETON: Privateers, always during any war I have ever heard of carried a pennant showing that they were under the Crown.

Mr. ROSS: As Mr. Collet has also remarked, privateers are always obliged to give security, and they are national ships. The "Sumter" was merely a New Orleans steam-ship. Two or three guns were put on board, and during its short cruise, seventeen of the northern merchantmen were taken, which shows that we could do the same thing. I have only one more thing to say—I hope that this subject will not be allowed to rest here, and that every one who has attended this meeting to-day, and who has been convinced that we made a mistake in 1856, and that it is necessary for us *at once* to resume our maritime rights, will, according to their several ability, do the utmost they can to impress it upon all whom they meet to try and get the fatal Declaration of Paris abrogated.

The CHAIRMAN: I am quite sure I may ask your thanks to the lecturer for his very able and interesting lecture.

¹ Vide "Further Correspondence respecting the War between France and Germany, 1870-71," (No. 1) page 20, where the German Decree is to be seen.



LECTURE.

Friday, June 16, 1876.

ADMIRAL SIR HENRY J. CODRINGTON, K.C.B., in the Chair.

"THE MARITIME DEFENCE OF ENGLAND, INCLUDING "OFFENSIVE AND DEFENSIVE WARFARE."

PART I.—THE ORGANIZATION OF OUR MARITIME FORCES.

By Captain R. A. E. SCOTT, R.N.

In the short space which has elapsed since I commenced the paper now in your hands, the manly and vigorous policy of our Ministry following up their purchase of a vested right in the great highway to India and the East, has for the moment vindicated our national position. The rapid changes, however, which have been truly marked by the money-market barometer, show what is still in the air, and prove the wisdom of the proverb, "If you wish for peace, be prepared for war."

If my paper should call greater attention to this necessity in a country the wealth of which is mainly a floating capital—our maritime trade, according to the *Morning Advertiser*, amounting annually to the enormous sum of 700,000,000*l.* sterling—I shall be amply repaid for the time spent in its preparation.

Before commencing from the stand-point of a few days since, I wish to remind you that the Mutiny in India happily found us with the veteran soldiers of the Crimea ready to our hands, and that on the other hand, the French, proud of their laurels there, and at Solferino, were never more confident of success than when they marched towards the German frontier.

We at the commencement of many a former war, have paid dearly for our own over-confidence, and have had to sacrifice not only vast sums of money, but also the far higher treasures of human life, before the pluck and dash of our soldiers and sailors, backed by the energy of our people at home, enabled us to pull through all obstacles with ultimate success.

The present time is ours; and I venture to think that at a very small outlay, we may at once make our preparations so complete, as not only to place our country in security, but also to make her so strong (by aniting her vast resources) as to preclude attack.

Were this done, our country would be enabled to maintain her position as the arbiter of Europe, and to use manfully the strength with which the "Giver of all" has so richly endowed us for the benefit of weaker nationalities.

I find that it is impossible in one lecture to go fully into the question of naval attack and defence, and to show the improvements which could be easily effected, and might be quickly carried out so as to double the fighting capabilities of our existing ships. I also wish to indicate the requirements of *future* war vessels from a sailor's point of view, having *due regard* to the full utilization of our present iron-clads and unarmoured cruisers. I therefore trust, that the Council of this Institution will permit me to bring these matters before you within a few days, and thus enable you to judge as to the necessity for initiating in the work-shop and drill-shed, and in carrying out other needful preparations, the vigour just shown in handling that national weapon, the British fleet.

In stating that we are a maritime people, and that we cannot maintain our position among nations if we suffer our naval force to decline, I lay myself open to the charge of uttering truisms, but they are truisms of such vital importance to us, and their truth is so constantly ignored in our measures, that I believe they cannot be too constantly dinned into our ears.

It will appear incredible to our descendants that it was left to a young Officer of the Guards publicly to point out to the English people that some twenty years previously we had voluntarily waived those maritime rights which constituted our only real defence in time of war. As Mr. Ross-of-Bladensberg states, "This, in a nation like "our own, could only have become possible when a veil of forgetfulness "and ignorance had dimmed the vision of the real cause of our former "success;" but how are we to account for the fact that whilst acknowledging as truisms the statements with which I have commenced my paper, we have done our best, and still strive after the unattainable position, of vieing with continental powers in maintaining *large* military forces? If anything could convince the nation of its folly, it would be the lecture of the young Officer who called our attention in this room last week to our "neglected maritime rights;" and I am glad to follow up that interesting lecture with a few words of caution on our "maritime defences."

Such words were never more needed than at the present moment. The political position of affairs is becoming more complicated, and an explosion may at any moment be looked for when all the conditions for a discharge of war-tension are so favourable as at present. Germany already possesses an active army of 1,200,000 men, and has, according to Count Moltke, an additional territorial force of 1,000,000 soldiers as a reserve. Russia has a force which, as Lord Derby tells us, "could be made up to exceed those numbers," governed by "the "most peaceful of monarchs" (see the *Times* of 28th January last), and yet "as great a conqueror as Alexander, Cæsar, or Napoleon . . . "forced by an instinct stronger than his will, which drives his people "southward and eastward to take possession of a territory three times

"the size of Germany." France is already repossessed of immense wealth, and is eager to recover her lost prestige, and these and other nations are all anxiously looking to what recent events in Turkey may force upon them.

How unreasoning we are! We admit all these elements of danger; we admit that our "very existence" as a nation depends upon our Navy; whilst urging the superiority of our fleet to that of other nations, we are obliged to confess that a reverse on the seas is *possible*, and that if a continental army once landed on our shores, we should run a chance of being blotted out from amongst the great powers. When we know on good authority that we are dependent even for the food of half our people upon a maritime trade passing over sea, and therefore particularly exposed to destruction in war time, we at once feel the truth of the observation, and yet we fail to make our ships, including their armament, as efficient as they may be made, or their number as great: we neglect to use the means which offer themselves for manning and maintaining them efficiently; we voluntarily give up our powers of destroying the commerce of our enemies; and we content ourselves with protecting our coasts with torpedoes which are almost as dangerous to ourselves as to our enemies.

Let us look at the first point I mention for a moment—the efficiency or inefficiency of our ships. I do not here propose to examine this critically. I wish merely to call your attention to one or two national characteristics, pluck and dash, which indicate the nature of the armament most suitable for us.

Before, however, entering upon these points, I must allude to one requisite in a good ship of war with which we cannot dispense, viz., "unsinkability." Unless a vessel can be kept afloat, of what use can be the finest crew, the most powerful weapons, and the highest speed? The "Captain" was a capital fighting machine as long as she could be kept afloat; and both the "Ré d'Italia" and the "Vanguard" were powerful engines of war, but what did this avail them in the hour of trial? I would therefore premise that this all-important requisite is a point in which some of our present ships would appear to be deficient, and that in my opinion the under-water deck, excellent as an additional means of defence, is not calculated to remove the defect. I hope, however, to be allowed to go into detail on this and other important questions in a future lecture.

The next point is that her weapons of offence should be such as our men would be likely to wield with success. Amongst such weapons I would almost, if not quite, give the first place to the ram. The nerve, coolness, and resolution of our seamen is proverbial among nations, and the ram is a weapon which could only be used with advantage where pluck and coolness go hand in hand, and where the resolution is well supported by the skill to direct the blow—yet several of our vessels are not armed with it, and of those which have it, some are too weak in the bottom to support the shock of impact with an opposing vessel of heavy weight. If, again, we look to the guns, we are not quite in such a position as I should like to see us.

We have at this moment only four 35-ton guns at sea in one ship,

the "Devastation," and two 38-ton guns nearly ready, with two more 35-ton guns, the sole armament of her sister ship, the "Thunderer;" but before we have at all assured ourselves that we have obtained from them the greatest results of which they are capable, we jump at once to 80-ton guns for no other reason apparently than to outdo the Italians, who first talked of 60-ton guns, and then to outstrip our 80-ton guns in size went to 100-ton guns. Will it not surprise some at least of my hearers, to be told that no 38-ton gun has yet been tested up to 100 rounds, or even a third of that number in quick firing; and that, so far as our experience goes with guns of heavy calibre, the metal of which the projectiles are composed, will not bear the pressure which it is necessary to put behind them in order to get up a moderate velocity. The shot of the 80-ton gun show a sensible enlargement of diameter, arising from the compression in the direction of the shot's length.

Whilst, however, we have waded into unknown depths in the direction of big guns, we perpetuate known defects in respect of those of smaller calibre. We know that an 18-ton gun will pierce the thickest armour-plating afloat, we equally well know that a 12-ton gun will not do so, and yet the "Sultan" and "Hercules" are the only two broad-side ships afloat which carry guns of the former size.

We adhere to cast iron for our projectiles. We found chilled shot the best thing known at one time, and we adhere to them, regardless of the superiority of steel. The result of this is, that the round form of front has to be adhered to; for, were the front *flat*, the projectile would break up on impact. But, as the flat-headed shot will bite at about 66° from the perpendicular, whereas the round-headed shot fails to do so above about 33° from it, the loss we may suffer from our backwardness in introducing improvements is only too evident. The Germans, however, as usual, being more apt than ourselves in "appropriating new forces" (to use the expression of the Chief Constructor), have manufactured flat-fronted steel projectiles for their 56½-ton gun. Even the Brazilians, with their little experience in naval warfare, are ahead of us in this. In the matter of gun-carriages, by dint of constant pressure, I succeeded, some few years since, in introducing improvements which met with the hearty approval of the Service; but these have never been fully completed. Without dwelling upon the sad end of the inventors of many of the improvements recently utilized for our naval armaments, viz., Norton, Lawrence, Chalmers, and Snider, I will refer only to the inventor of the Harvey torpedo (the very weapon for our sailors), and himself, the man of all others qualified to teach them to use it, who had to appeal to foreign countries to recoup the expenses he had been put to. With such an instance as this of our backwardness in using the mechanical skill of our people, we cannot feel surprised at the statements in the public prints, that inventive talent is languishing, to the great detriment of our national wealth.

When we turn from the weapons to those who are to direct and wield them, we find our preparations equally backward. This great country possesses rather less than 20,000 naval seamen; it has no

reserve, except old Pensioners, and no plan for supplying the large number of men that would be needed in a prolonged struggle. The so-called Naval Reserve force, expected to number 20,000 enrolled men this summer, could not be removed from the Mercantile Navy without destroying our trade; and the number of Coast-guard men who could be advantageously sent from their stations on shore, is much too small to supply the gaps in our trained men in time of peace, and would prove but a drop in the ocean in time of war.

The Royal Marine force has been reduced to the number which is sufficient only for ships in commission, and very recently it was proposed to abolish it altogether. Really the lessons of former wars appear to be wholly thrown away upon us! Here is a force to which we ought to look for keeping up the supply of trained gunners, with "sea-legs and sea-stomachs" (as Captain Wilson expresses it), a force of infinitely more importance to us than troops of the line, consisting, as it does, not only of soldiers but of skilled naval artillerymen, and we quietly contemplate supplying their places with raw recruits obtained at enormous cost in times of danger, and, when obtained, likely to require nurses to look after them, until the time of sea-sickness is got over. Marines, on the other hand, on being embarked, are at once at home, adding to the power and discipline of our ships while they remain on board, and ready at a moment's notice to land and show themselves, as they have ever done, enduring, reliable, and loyal soldiers, and hold tenaciously such of our dependencies or coaling stations, as it might be of vital importance to us to keep fast hold of during a European struggle. We have not, however, yet made as much out of them as can be made. In the commencement of our Peninsular war, the Duke was constantly thwarted by the want of trained artificers to carry on the operations of a siege, and the corps of Royal Engineers was created—a corps which has since been as eminently useful to us in peace as it proved itself able in war. Our future naval operations will require mechanical skill, and a readiness of expedient, to repair our gun-carriages and other weapons, such as can be obtained only from early training. On talking over this matter lately with Captain Wilson, he suggested the question: Why not create from our Marines a corps of Royal Naval Engineers? The idea appears to me well worthy of our earnest consideration. We have had, only recently, too many costly instances of the want of mechanical knowledge. To look to the Merchant Service to replace our valuable trained men is, I repeat, a serious mistake. To attempt to remove the so-called Royal Naval Reserve men, who are the backbone of the Merchant Navy, would entirely upset its discipline. We should have innumerable repetitions of such massacres as those which have recently startled us, and our commercial lines of traffic would be thrown into hopeless confusion. The maintenance of our foreign trade is a first necessity, and to touch its *personnel* would quickly bring about that which Admiral Porter points to in case of war with the United States—the destruction of our commerce.

The rising sailor boys, as I have repeatedly pointed out for several years past, instead of being trained in the use of machinery and in

that practical gunnery which they will hereafter be called upon to employ, are still drilled to run about with handspikes and tackles and, by-and-bye, when past the age at which the eye and hand can be taught to act in unison, will be required to exhibit the thoughtful and steady precision needed for working guns by steam-power. This is not the way to ensure that each of our costly bullets shall reach its billet, and do its full work upon an enemy.

This leads me naturally to the next point of our mistaken policy. We are not only prepared to risk the destruction of our own commerce, but have voluntarily given up the power of destroying that of our enemies. "His Majesty," writes Lord Heytesbury, in 1802, "will never consent to place out of his hands, in a treaty of peace, those means which may be necessary for the security of his dominions in time of war." We have since been fatuous enough to do so, and the possible consequences have been so clearly pointed out in Mr. Ross's able paper, to which I have already alluded, that I need say no more on this point.

Finally, no steps have yet been taken to unite and organize the large forces of which we could make available in time of war for the defence of our coasts. Thus, with a numerous sea-coast population, possessed of every attribute necessary for waging successful warfare against all comers, with maritime resources far superior to those of any other nation, we may, by some unfortunate combination of circumstances in these days of rapid movement by steam—when invasions, to quote Lord Mansfield, are always ready organized,—find the command of the seas about England in the hands of our enemies, and our country at their mercy.

At the present moment our first line of defence consists of a few small turret-ships and gun-boats, which would be unable to keep the sea in heavy weather. It will take months to fit out another sea-keeping ironclad squadron, and long before the fleet on which we pride ourselves could be brought from the Mediterranean, a combination of two or more hostile powers might send to our shores a fleet and an army which by a sudden and unexpected blow would do us incalculable damage.

And now for the remedies I would propose. I will commence with the last defect I commented upon—the absence of an organization of the *personnel* of our maritime resources. This is perhaps the most important point, and it is the one which should be first attended to. We have in our veteran coast-guard men the best possible nucleus for a defensive coast force. These men have been trained as gunners, have been long accustomed to judge distances at sea, and are familiar with the powers of their guns.

Next there are our yachtsmen, consisting of the pick of English sailors and fishermen, and numbering not far short of 5,000 men, who might all be trained with advantage to themselves as well as to the country to the use of guns and the working of gun-carriages of the newest type.

Then again we have at all our sea-ports, numbers of fishermen and boatmen, as intrepid and bold as heart could desire, who would by

trifling encouragement be made to swell this reserve force, and to find pleasure in learning to fire well.

The dockyard men, or some of them, could be trained to be stokers, so as to be available as a reserve of stokers in time of war; their places being supplied by naval pensioners, who should, as far as possible, be employed when extra hands are required at our dockyards and arsenals, so as to know this work when called upon to perform it.

Lastly, there is our large body of Volunteer artillery and infantry, who have already made themselves skilled marksmen, either with large guns or rifles, and whose natural aptitude for shooting might be kept up and increased by periodical competitions and drills under the direction of our Admiralty and Naval Commanders-in-Chief.

Wherever, therefore, landing-places exist on our coasts, and at all these, coast-guard stations are to be found, I would have stations to which the above-mentioned forces should be told off, and these stations should be provided with suitable guns, and be connected with London by telegraph, and with each other by good roads and railways, as well as by telegraph wires and other modes of signalling.

These forces should be practised as far as possible afloat as well as on shore; and both for purposes of drill and defence, gun-boats mounting plate-piercing guns should be stationed at all our sea-ports and off our principal landing-places.

The fast river steamers should, in time of war, supplement these gun-boats by acting as torpedo-craft, whilst our steam-tugs, acting as rocket-vessels, should be in readiness to ram and run down the enemy's transports and boats. If the whole of our available craft of these descriptions were told off to the stations nearest the places where they ply, they would easily, under the skilful commanders of these river vessels, and united under the flag of a dashing Commodore, throw a hostile force into confusion and render a landing impossible. The addition of a fire-ship, or an explosive vessel or two, would complete their work upon the fleet which brought over the forces intended for our destruction, and the result would be such as to leave us in security from a similar attempt for many years to come.

I have thus briefly indicated how England's defence can be insured by local means, and that the requisite forces could be provided from local sources without materially interfering with our manufacturing people, which is a point of the utmost importance to us; without drawing upon the seamen of our Mercantile Marine, which is of still more vital importance to us; and without detaining on our coasts the war-ships needed for their protection, and for destroying the fighting ships and ruining the commerce of the enemy.

I will now proceed to show how the last can be supplemented with other forces at our disposal, and enable our trade to be successfully carried on by our merchant navy.

The Mercantile Marine comprises numerous swift ocean-keeping passenger steamers,¹ which in war-time would doubtless become the carriers of a large part of the most valuable portions of our merchan-

¹ Efficient despatch vessels could always be selected from these.

dise, as well as of the munitions of war required at our more distant naval stations. Such vessels would, if war were now to break out, owing to the absence of organization, be dependent for safety on speed alone, and become a source of weakness rather than of strength to our fighting ships. What seems to me to be required is, to arm them with light guns, torpedoes, and Congreve or Hale rockets, and to enrol the men who will have to handle these weapons as part of the Royal Naval Reserve, and by appropriate rewards to induce them to take an interest in their drills, which should be taught them at the expense of the nation. Provision should be made by the arrangements at all our ports as already indicated for imparting the necessary instruction and for exciting interest in the work without interference with their ordinary duties, and the effect on their *morale* would be very great. Whilst waiting for another engagement, the better class of our seamen would hail any employment of this kind with satisfaction, and their feelings would influence others.

These drilled men should be divided, first, into two classes or more, the lower to be called gunners, and the higher class marksmen, both classes to be given suitable badges and also a small retainer in the shape of pay, and pensions when wounded in action. The badge would be a public recognition of their skill, and show them to be militant, and this honourable mark of England's appreciation would render them more patriotic and more eager to perfect themselves in the use of the weapons they would have to handle should war (as it undoubtedly will) come upon us.

Vessels manned in part by such men would soon become permeated by law-abiding principles, and being provided with proper arrangements at the Government expense, and with a subsidy to cover the increased insurance in war, would become a very cheap and efficient force, fully making up by speed and numbers for the lightness of their armament, and rendering the further addition of lightly gunned royal cruisers "needless."

Secondly, with regard to foreign seamen in our Mercantile Marine. The Danes, Swedes, and Norwegians are of the same stock as that whence we sprang, and have so nearly the same sympathies and interests as ourselves, that I believe we should do right in giving them all the privileges of English citizenship, so as to bring them into closer relationship with our own sailors, who would, I believe, benefit by their temperate habits as much as they are now deteriorated by companionship with the sailors from the mixed seafaring populations of the Mediterranean. Were this to be done, and the chance of prize-money or bonus superadded, I think the necessary supply of reliable merchant seamen could, if wished, be readily obtained from our natural allies.

The Mercantile Marine would by these means strengthen the Royal Navy, and could continue to do its work of providing supplies during war, for its *personnel* would be kept up to a thoroughly effective strength.

I have only to add that the merchant navy, thus organized and commanded by its own officers, duly trained for such work and

rewarded by honorary rank as lieutenants and captains, would when moving within certain pre-arranged parallels, be enabled to defend itself against privateers, and would likewise be enabled to act as a medium of communication or connecting link between our war cruisers, stationed to protect them against ironclads or heavy war vessels.

This protection against the enemy's war ships can only be secured by powerful cruisers; and, looking at the vast water frontier and the extended possessions which England has to protect, with a naval force of under 20,000 trained sailors, the question as to what class of vessel will be most useful, *i.e.*, good at all points, becomes very important. The strength of the metals of which she would be built is measured by their tenacity at the weakest part, and this simple rule is not inapplicable to so vital a matter as England's maritime defence. She cannot afford to run the risk of a serious wound to her commerce, even at her most distant possessions; and, therefore, every individual ship built for fighting should contain within herself every element of offence and defence. The size of this vessel must be greatly influenced by cost, for there is a necessity for the employment of a large number of such ships, for, as the *Times* informs us, and I think it wise to repeat the statement, "that the most powerful of ships could "only be at one place at a time," and that, allow me to add, would be just the place a wary adversary would steer clear of.

As already stated, the immediate duty of fighting cruisers would be the protection of our commerce against the enemy's war ships, and therefore they would be spread out along the lines of traffic, keeping up communication one with the other by means of electric lights at night, fog horns of great power, and other pre-arranged signals; and gathering intelligence from the merchantmen passing them. It appears to me that these war ships could be coaled and provisioned at sea by means of suitable extemporised rafts, which their crews should be practised in putting together and in using for landing their men; and I think these cruisers or sea-watchers might be often anchored in mid-ocean. Very light telegraphic lines could perhaps, in many cases, be laid down, with buoys and flags to mark anchoring stations; a plan which, if as successful as similar devices in the Crimea were, would place England, the flag-ships of her Commanders-in-Chief at the principal foreign stations, and the sea-keepers in mid-ocean, in close communication. Should such an arrangement be found too difficult for achievement at the present time, a telegraph ship or two and a station on shore might be provided for the more important points.

Before concluding my paper, I desire again to urge the necessity which exists for the better organization and teaching of our crews, and for giving every facility, both to Officers and men, of acquainting themselves thoroughly with the handling of our newest weapons, under all the varied conditions of maritime warfare.

Our ships now abound in engines for destroying life, which require long and careful training to use with that steady coolness and precision which lead to victory.

Nelson, Cochrane, and others, like Alexander, Cæsar, and Napoleon,

were themselves masters of the art of war, and hence could inspire their followers with confidence; but what commander could inspire an untrained crew with the knowledge and skill needed to manage the machinery of a ship, and to work her 80-ton or other guns by steam machinery?

The devotion of German Officers and men to mastering their duties is now proverbial, but it is not so well known that the French Government has recently published plans of all foreign ironclads, for the instruction of its Naval Officers. May we soon follow the example thus set us, and stir up such of our Officers—as have the requisite mechanical knowledge and are able to impart it—to teach our Navy the relative values of the different guns and armour used by all maritime powers.

If the preparations which I have mentioned as essential to our maritime supremacy be postponed, owing to our self-gratulations at the immediate results of our recent unexpectedly vigorous policy, it is to be feared that our pre-eminent pluck and dash may not prevent our being landed in disaster, when opposed to the better disciplined skill of more painstaking nations.

If, however, the organization of our maritime forces be at once undertaken, and the strength and nerve of our seamen be utilized as they should be; and if full advantage be taken of our mechanical skill in improving our armaments; I, for one, should have no fear that we should lose that empire of the sea which we have so long and so gloriously maintained.

The CHAIRMAN: If any gentleman feels inclined to give us further information, we shall be very glad to hear him. I hope there will, by permission of the Council, be a further opportunity of hearing the second part of the subject from Captain Scott. I should like to remark that the question of laying down telegraphic lines in mid-ocean has been tried, but hitherto unsuccessfully. I have a recollection of a floating vessel, the "Brick," being moored in the chops of the Channel for that purpose, and it was found rather an impracticable thing, not merely as a mercantile speculation, but also as to certain mechanical difficulties. I do not say these difficulties cannot be got over, but we should like a little more information with regard to the mechanical part before we can agree as to its feasibility. I did not quite understand how the extemporaneous rafts for coaling are to be used at sea, and I should like to know that from Captain Scott. Many years ago, the idea was advanced of utilising large merchant steamers for carrying naval artillery, that is to say, preparing them so as to put heavy guns into them if we should require their services in war. I rather think a certain number were thus fitted, but the plan came to nothing nationally, because it was found that the alterations requisite for converting them into vessels capable of carrying what were the heavy guns of that day (though their weight would be trifling as compared with the ordnance of the present day) were so great as to materially interfere with their passenger capabilities.

The EARL OF DENBIGH: I wish to ask Captain Scott if he has heard of a plan which I met with not long ago. A gentleman who has given a great deal of time and consideration to the defences of our country, told me that he had made drawings of a plan, which had much interested Sir William Wiseman, for utilising the merchant vessels, or rafts, or any floating craft which you might be able to lay hold of, at a few hours' notice in case of invasion. He would have a sort of built breast-work, shot proof, something on the circular principle, like the "Popoff," which should surround any such craft. A temporary deck might then be thrown across of sufficient power to bear the guns. He would also have a built dome that would work in sections over this, sufficient to turn ordinary shot. The advantage

was that he would be able to get a steady deck to fire from. I only heard of this in conversation, but when he told me he had submitted it to Sir William Wiseman, who thought highly of it, and that it might be worked out, I was anxious to take this opportunity of asking Captain Scott, or anybody else present, if they had heard anything about it.

MR. SCOTT RUSSELL, F.R.S. : I feel it to be my duty as a shipbuilder to say that I feel highly gratified at Captain Scott having put to us a problem, which I am anxious sailors should put to us, as to whether we can do what they want. He says that he distinctly wants to have unsinkable ships. Now, I venture to answer him in one word that it only needs that sailors should wish to have unsinkable ships, and they can get them, not only without practical inconvenience in the use of them, but with great practical convenience in the use of them, and with great addition to the security of the ship, and the manageability of the ship and the gun batteries. I hope, therefore, that in the next paper he will give us, not only his views as to the extent to which he desires to have these unsinkable ships, but will also go further, and let us shipbuilders know what are each and all of the other qualities he desires, to make his war-ship fit for his sailor's purpose. May I just make one suggestion to him for the next paper? I should like him to say the degree to which he desires his ships to be handy and clever at backing, manœuvring, stopping, and turning, because I can tell him that ships far more handy than those we have now in the Navy have been made already for other purposes, and might most easily be adapted to the Navy, if the sailors wished; but if they won't say what they want, how can they expect us to force them upon them? On one point I hope the author of this paper will dwell in his next paper, for I have been much delighted with his allusion to the subject. As I am not a sailor, I only speak to you from the engine-room; that is my department. Now, speaking to you from the engine-room, I venture to make a suggestion to the members of the profession, which my experience in the engine-room makes me think of great value. I think that all the Officers on board ship should, as much as possible, be trained to the knowledge of the others' business, in order that they may know how to co-operate. For example, I think a sailor should know as much as possible of the engines, of the engine-room, and of the boilers; for I think without that knowledge, the captain on the upper deck, steering his vessel, may make very great blunders. I have often myself steered vessels. It was my good luck as a boy to be trained to the sea before I was trained to the engine-room, and to get sea legs, and all that sort of thing, before I took to shipbuilding, and I have always been grateful for it. But I have seen from the Captain's signal-room most erroneous and most injurious signals sent down into the engine-room; signals that could not only not be fulfilled, but if they had been at the time, and in the succession, and in the way in which the Captain gave the orders, they would have destroyed the engine. And why was that? Because the Captain on the deck knew nothing whatever of the engine-room to which he was speaking, and he therefore gave orders which were contradictory, impossible, and most dangerous if attempted to be carried out. I would insist on all engineers being good, well-trained seamen, who would not be unwell, nor have bad sea-legs, nor anything of that kind when they went to sea; and I would insist on all commanding Officers knowing thoroughly everything that would be going on in the engine-room after they had given a certain order. Now I carry this a great deal further. I would like you to train sailors to be good stokers when they are wanted; I would like you to train sailors to do everything to help us in the engine-room when we are in a difficulty, and we are often in a difficulty; and I should wish in like manner that sailors should know everything about our pumps, and our pipes, and all the communications that run out from the engine-room, in order that when mischief happens, they should each of them know what to do to help us, instead of going and doing what hinders us. They should know how to keep water out of our engine-room, instead of going and sending the water into the engine-room, which they often do with the best possible intentions. I therefore have to entreat you, as gentlemen of your profession, to try and extend the education of all men who serve on board a ship to a knowledge of the work of others to a certain extent. I hope you will not think me impertinent if I say, for example, that I think there are occasions when a great gun or a gun-carriage has suffered a little from shot, when it may be useful

for you to call the engineers and fitters out of the engine-room to help to make good your gun-carriage, and to help to put it in order again. I think it would be well that you should before-hand take these men and drill them to know what a gun was, and what a gun-carriage was, and how to be able to come to your assistance when you want them. In short, Gentlemen, I have hitherto looked upon a British sailor as the most capable of mechanics, as the most admirable of labourers, and as the most capable of workers when I wanted one. When I wanted land-work cleverly done with a few hands, I have been in the habit of employing, not landsmen, but retired sailors to do my land-work, and I found them do it much more cleverly than landlubbers. Therefore, I entreat you to consider all the inmates of a ship as one great family of clever fellows, each with a speciality of his own, and try and drill them, and train them, and educate them, so that every one of them should be able to give help to the other when there is a difficulty.

Captain J. C. WILSON, R.N. : Being a sailor, I must answer what Mr. Scott Russell has said, because it might lead to a wrong interpretation of what our duties are. The duties of those in a man-of-war may be compared to those which have to be performed in a town of considerable size. Now, I would like to ask whether it is practicable or possible that every person in a small township could be able to do his neighbour's work? With all due deference to Mr. Scott Russell, a little knowledge is dangerous, and every man should stick to his own work. Let every sailor know his duties as a sailor, every stoker know his as a stoker, and let engineers do their duty, and I have no doubt the executive part of the Navy will not be found wanting. It is a piece of impertinence for me to question what such an authority says, but such are my views, rightly or wrongly. To fall back to the very instructive and interesting paper which the gallant lecturer has read, as he has been good enough to refer to me by name once or twice, I should like to answer a few of his remarks. In the first place, I will say the root, the kernel, of the whole question is, "The Declaration of Paris," as was so clearly shown in the lecture read on it in this theatre by that very talented young Officer, Mr. Ross. Without that lecture it would have been nonsense to have discussed the paper before us. I am speaking, of course, with reference to that part touching the question of the protection of trade. If "The Declaration of Paris" is allowed to remain as it is, it presents to us one phase of the question; if it is done away with, which the bulk of us hope it will be, it brings the question before us in a totally different light. With "The Declaration of Paris" in existence, the bulk of the trade of England must pass to neutral flags whenever war is declared. We should, therefore, not then require such a number of cruisers, nor such an extensive system as we should otherwise do. I do not say our trade would pass to neutral flags from want of proper protection, for no doubt they would be as well cared for as possible, but, as was shown in a letter in the *Standard* the other day, the war premiums on insurance must drive the bulk of our commerce to neutral flags. I will divide our commerce under two heads: the ships that are insured would pass to neutrals, and those uninsured, which will probably remain under our own flag so long as they receive tolerable protection. These latter vessels I will again divide into two classes. But before we proceed, let us for convenience suppose that "The Declaration of Paris" is done away with. We should then, I think, divide our trade into two classes, viz., ships of 12 knots and upwards, and ships of less speed. The ships of 12 knots and upwards would probably rely on their heels, and be lightly armed, as suggested by the gallant lecturer, to defend themselves, and to fight their way if need be. They should be protected by cruisers, stationed, say, at 24 hours' intervals from each other on the principal lines, such as between England and America or the Brazils. We should, besides, require squadrons to protect our coaling depôts and narrow channels, such as the chops of the Channel, the Gut of Gibraltar, the Straits of Magellan, the Straits of Malacca, Hong Kong, &c., &c. Then we come to convoying. Convoys, I should say, would include all our coal and grain-carrying vessels, our timber trade, and generally vessels of about 8 knots speed, carrying on the heavy trade of the country. These vessels would have to be convoyed by very strong squadrons, probably with an ironclad at the head of each, and a certain number of frigates and armed merchant ships, as auxiliaries.

To man all these ships would require a very large number of seamen. And now we come to another point, which I purpose touching on very lightly—the *personnel*

not only of the Navy but of the Merchant Service. We have had papers read in this theatre, and some of the most intelligent members of Parliament, shipowners and others, have spoken on this vital subject, and the conclusion come to is, that the Merchant Service is now in the most lamentable state, and that England does not possess more than 20,000 or 25,000 skilled British merchant seamen. That certainly is a very small number. We require 50,000 skilled seamen to carry on our trade, besides others who are not skilled, that is to say, ordinary seamen and boys, stewards, cooks, and all the numerous callings which now form a ship's crew. But we require 50,000 able-bodied, skilled seamen. Out of these we have little more than 20,000 who are English; the remainder are made up of foreigners, 15,000, Indians, 7,000, and about 5,000 negroes, and every year the number of English is getting smaller and smaller. When it comes to the tug of war, and we take the skilled seamen who belong to the Naval Reserve, from the Merchant Service, how are we to man our merchant ships? It is all very well to talk of our magnificent ships trusting to their heels, and, where compelled, fighting, but who is to fight them? You cannot do on board a ship without a certain percentage of sailors. Those who have been in an emergency know what a good seaman is. A good seaman is a good man anywhere, but a good *sailor* on board ship is better than any other man, however good he may be. You may possibly do with a smaller proportion of good seamen now than formerly, but you still require a certain proportion, and without that proportion you will never get on safely. Taking all the best men from the Merchant Service, we shall then only have enough men to man our war fleet, without the auxiliary vessels which we should have to call in from the Merchant Service. There is one point which Mr. Scott Russell did not touch on, though I hoped he would, and that is the fitting of merchant ships to carry guns in time of war. I heard from very good authority—an authority which I am not at liberty to name, though you would all respect it—that when building these large ships of 12 and 13 knots speed, if Government chose to subsidise them by paying 3 or 4 per cent. on the value of the hull, the shipbuilders are prepared to build them of such a scantling that they will be able to bear a good armament, a chase gun beside broadside guns, and thus be available in time of war to be turned into cruisers. The sum would not be very large, as the engines would not be included in the cost.

As to the organization and training of the Navy, that is a subject upon which I have already read a paper, and I think our men in the Navy are about as badly trained and as unfitted for their work, taking them all round, as any first-class naval power would dare to have its seamen. The men themselves are fine fellows, physically fine, with some education and a considerable amount of discipline, as compared with olden times, but they are imperfectly instructed as fighting men, and very inferior as sailors. Whenever they reach a certain age, they desert if possible.¹ The average age of the men in the Navy now is very young; they are mere boys. I remember going with a French captain to see the ironclad ship "Ocean," and when we came away he said to me, "Why, Wilson, that ship is not *manned* at all, she is only *boyed*." And sure enough she was; and I ask any gentleman here in connection with the Navy to go on board any of our ships and look at the seamen. Three-fourths are boys, or youngsters under 20 years of age. I say this is unsatisfactory, and every year it is getting so. We have no reserve to fall back upon, because the merchant seamen, however good they are as such, are unskilled in the use of arms, or so partially so that they are unworthy of being classed as a reserve of fighting men. They are also undisciplined, and what is more, their career in life is such as to make them more undisciplined than ordinary landmen. Another point that the gallant lecturer spoke of was the number of non-

¹ It was stated by the First Lord in a recent debate that the desertions were so few, being only 4 per cent., as to show no discontent on the part of the seamen in the fleet; but he did not explain that but a very small proportion of the men are so placed that it is possible for them to desert, for, of course, they cannot do so in the Persian Gulf, China, South Seas, African station, or North Pole, and, in fact, only in England to a limited extent, Australia, California, and the south-east coast of America. But where they can escape they go, not in the proportion of 4 per cent., but more nearly in that of 20 per cent.—J. C. W.

combatants, only partially disciplined, if at all, and untrained to the use of any arm on board a man-of-war. This is a most serious matter, and I cannot understand how members of Parliament, knowing such a state of things to exist, can listen to people who say the Navy is as it should be. At this present time, when there is the prospect of a war in the East, there is a ship fitting out, the "Hotspur," at Plymouth, to join the Mediterranean squadron, with 57 per cent. of her crew non-combatants! Now, I ask soldiers, civilians, or anybody else, can any one believe that the Navy in such a state is satisfactory? The number of non-combatants varies from 30 per cent. in vessels of the "Sultan" class to 57 per cent. in the "Hotspur" class. With her crew of 200 odd men she will go out say to Salonica, with but 43 per cent. of men used to arms. If there is an outbreak, and she is required to land 50 men, a valuable ship will be left in the hands of those who are wholly untrained to the use of arms, and who do not know whether shot or powder goes in first? And, mark me, such is the case in time of peace, but what state would she be in time of war? In war-time she will not have 43 per cent. of fighting men on board, because she will be filled up with a certain proportion of Naval Reserve men and others, trained only partially to arms. Now, I cannot for the life of me understand why all our crews should not be as well trained as fighting men, and disciplined as marine artillerymen; nor can I understand why our stokers, carpenters, cooks, stewards, all the present non-combatants on board a man-of-war, should not be as much fighting men, and as highly disciplined, as those of the Royal Engineers. The number of men we have in the Navy is, as far as I can see, ample, and the number of our reserves would be so too if they reached a proper standard of excellence, and had passed through a man-of-war. But they do not reach that standard, nor are they men-of-war's men in any sense of the word; they are inferior in training to men in foreign navies, and certainly in time of need we should find ourselves placed at great disadvantage. Material we have lots of, qualified men-of-war's men we have not in any numbers.

LORD RANELAGH: When answering the questions, will you have the goodness to gratify my curiosity, and give some information as to that curious-looking thing before us, which I understand from you is Hale's rocket, and has a very considerable penetration under water, and will you have the kindness to tell us what that penetration is?

ADMIRAL SELWYN: I rise to give a very cordial and almost entire approval to Captain Scott's paper, read with his accustomed clearness and perspicacity. There are, perhaps, a few points in which I may strengthen his argument; but very few indeed in which I can say anything to contradict him. The question of the food supply which this country would have to face in the event of war is pressing more strongly than ever before, in consequence of the efforts of Captain Ead's to open up the Mississippi mouths. This, when effected, to Europe gives the command of the whole of the corn of western America by water carriage capable therefore of being transferred at a price one-third of that which is now paid for the transport of corn coming from that country.

It is perfectly clear that the longer war is continued, the less probability there is of any great food supply being found in this country. The more easily corn can be brought from America, the more we shall rely upon external supplies, and the more our farmers will devote themselves to the raising of meat-food instead of corn. The supply from the east might become precarious, because the commerce of the Mediterranean, which would enable us to rely on the production from the Danube, might at any time be interrupted. With regard to fast river boats, I presume for torpedo-work principally, to which Captain Scott has referred, I have just seen with the greatest pleasure in Mr. Thornicroft's yard, a torpedo boat at last made for the English Government. The Austrian Government had two of 18 knots an hour, and the French Government one. We are now having one built, but at the same time there is a statement in a morning paper that other firms are running boats of 24 miles an hour, and will engage to make a contract for 30 miles. With regard to the organization at each port, which I have always strongly supported as the best means of guarding our coasts, I disagree with Captain Scott just to this extent, that I think the present state of the Navy may lead us to expect enough active young Officers, thoroughly trained and disciplined, to do all the teaching required. These men would be fit to teach a considerable number of untrained levies, and it

would be vain to expect the Officers of the Mercantile Marine, however zealous, to have the modern knowledge and practical experience which could alone make them fit to train these men. I therefore think I might ask Captain Scott to reconsider his views on that point. As to the coastguard's men being relied on in war, I can only say if they have deserved their name, not being now much employed in protecting our shores from illicit commerce, their chief value would be as a nucleus of organization, round which all the coast levies might be accumulated in the case of war on the ocean, and of the abolition of that extraordinary Declaration, the wisdom of which has been so ably confuted in this theatre by Mr. Ross-of-Bladensburg. I quite see with Captain Wilson that we should have to divide our merchant ships into classes, of which some would necessarily be convoyed, and others would trust to their heels for safety. But what is the use of attempting to convoy when your carrying vessels carry ten days' coal, and your convoy only three? Can you expect to diminish your dangers by enlarging the time during which the danger lasts? Would it not be better to consider the manner of enlarging our fuel-supply by some recent inventions? We have done a great deal of late years by the introduction of high pressure into the Navy, but we are a very long way from having considered the importance of the economy of fuel, and that is the life of a warship to-day. Sea telegraphs were observed upon as being difficult, but they have only failed because a vessel which was fit to ride under sail or steam at sea was put to do the duty of a light ship. Mr. Scott Russell's observations were so ably combated by Captain Wilson that I have very little to say on the subject, except that I do not think that you can ask or expect men to be thoroughly trained in every pursuit. It is utterly out of the question. A thoroughly good stoker may not make a good man to go aloft. Even our marines, zealous as they are, object occasionally to go as high as the mainyard, and they are better trained than we could hope our stokers to be. But there is more than that. As long as I was serving actively, I never knew a case in which an appeal from the engine-room was not met with a ready response by the Officer of the watch; and, indeed, in many cases additional pay has been given to induce the men to do the stoking work. I should be very much astonished to hear that the knowledge of steam machinery has fallen off among our Officers since my day. I could myself go through an engine-room with any engineer, and should be sorry to know that with the increased facilities for instruction, our Officers are less acquainted with that subject than they were. But I do not think it advisable that the Captain should be boatswain, gunner, carpenter, and engineer. He must rely on that due subordination which has been the essence of our success, viz., every man knowing his own duty and doing it thoroughly, and then, whether it is the Captain doing the duty of the head, or the men doing the duty of the hands, the work will be thoroughly well done. Only one word more with regard to the possibility of arming merchant ships; I have passed over the Atlantic during the last few years, backwards and forwards, in the largest and best ocean steamers. There is no difficulty whatever in those ships carrying guns if you consent to let them carry them as they can. If you insist on broadside ports they cannot do it. If you give them centrally disposed guns with proper carriages, calculated not to strain their frames, they can carry them with very little preparation. It is a question of a comparatively small weight, and I am quite sure that a very little solicitation on the part of the Government, a very little attention paid to the question, a little patriotism appealed to, would induce provision to be made for such a purpose in the event of war breaking out. I do not think that the nation could fairly be called upon to pay an armed subsidy during peace, either for guns or for fighting. Our merchant ships in the old wars put their very highest pride in being able to beat off the enemy's men-of-war, and I do not think Britons have so degenerated that the Mercantile Marine would fail in this work in any future war.

MR. SCOTT RUSSELL: One word in explanation. I did not mean that one man was to meddle with another man's trade. What I meant was, that each man should thoroughly master his own trade, and then know enough of the duties of every man about him to be able to give him thorough, cordial, intelligent help. More than that I should be very sorry to say.

MR. PAWNE: I think I have overcome those difficulties that have been spoken of

by my patent for unsinkable ships, patented in 1874, No. 1174. It consists of a double ship, and the inner ship is capable of supporting the outer ship if she is penetrated in any part whatever. My unsinkable ship is constructed in longitudinal as well as transverse sections, so that if a shot penetrated one section, and had not force enough to reach the inner ship, she would not sink. Had the "Vanguard" been built in that way, she would never have sunk. I have also a patent for armour, No. 4080.

Captain PRICE, R.N., M.P. : There is one topic which has not been touched upon here this afternoon, but it is one which I think any naval Officer, and I am sure both the gallant lecturer and yourself, Sir, will expect us to give some consideration to, namely, the question of the guns. Naturally when we are considering the strength of our Navy, and of the ships which compose it, we must go very considerably into the question of the armament of those ships. I won't say that Captain Scott has given us alarming information, because I do not think he has come here with any pessimist views, but amongst other incidental points to which he has called attention, he has made this remark : "It will be astonishing to my hearers" perhaps to be told that no 38-ton gun has yet been tested up to 100 rounds, nor even to one-third of that in quick firing." I am sure that remark was not introduced without having the object of implying to a certain extent a doubt as to the power of these guns. He naturally meant, I take it, that if these guns had been tested to such an extent very likely they might not have been found capable of enduring that test. Well, as I have myself thrown doubts on this subject, I should like to say one or two words about it. From returns which have been presented to us of the different tests to which these guns have been subjected, I have found not only that no large gun of this kind, 35 tons or 38 tons, has been subjected to such a test as 100 rounds fired in such a way as they would naturally have to be in an action, but in the tests that they have been subjected to, I have found that no gun of such a weight has fired as many as sixty rounds without requiring repairs. I do not mean to say that the gun has shown signs of bursting, or that it has become entirely disabled, but the gun has been rendered *hors de combat* for the time being. It has been said that such repairs as were necessitated by this amount of firing might be performed on board ship. Well, no doubt if the implements and artificers were supplied, they might be under certain circumstances, but I confess I am very much inclined to doubt that they could be carried out in the face of an enemy, or whilst the operation of blockading an enemy's port was going on. I have taken the opinion of naval officers, gunnery officers, who are capable of giving an opinion on the subject, and they certainly tell me that such repairs could not be carried out. But whether they could or not there is this to be said, that the necessary implements have not been supplied to those ships which carry these large guns, so that on the principle that the strength of a chain must be tested by the strength of its weakest link, we may say that the strength of Her Majesty's ships "Devastation" or "Thunderer," apart from her ramming powers or the torpedoes which she may carry, must, among other things, be calculated by the strength of the vents in their guns. On one occasion, in another place, I was answered by a very high authority, one to whom the nation looks for an opinion upon points of this kind, that even admitting, for the sake of argument, that these large guns might not be capable of firing more than fifty or sixty rounds without being obliged to be sent home to England for repairs, really, as a matter of fact, that ought to be considered quite sufficient. The actual words, I think, were, "People might think it necessary that the guns should be revented after every fifty rounds; but if they fired fifty rounds in action, there would probably be very little left for them to fire at." I am rather inclined to doubt that. At all events I should like to see the thing tried. It is all very well for us to brag about our maritime forces; it always calls up a cheer; but I think we ought to look steadily into the facts of the case, and with that idea I have always advocated, and shall continue to advocate, a really practical test of our guns. I want to see these large guns of ours tested exactly under the same conditions as they would have in an action at sea. It is very difficult really to say how many rounds we might expect the "Devastation" to be obliged to fire in action at an enemy of similar build, and of course we must always pit our best ships against the best ships of the enemy. The only really practical test which we have

ever seen our large guns submitted to was one in the year 1870, when our three largest ships, the "Captain," the "Monarch," and the "Hercules," were sent out from Vigo Bay to fire at a large mark. I have the numbers here in a lecture given in this theatre by Captain Colomb, and I am taking the figures from his lecture. The ships were sent out to fire at a rock distant about 1,000 yards. I was in Vigo Bay at the time, and saw the experiments. The day was almost absolutely calm; at all events there was not the slightest motion I think on board any of the ships. The rock was 600 feet long and 60 feet high; that is to say, twice as long, and four times as high as a ship. That is the chief point to which I would call the attention of naval gunners,—that the rock was four times as high as a ship, because that is where the accuracy of firing at sea is more particularly required. The "Hercules" fired seventeen shots, of which ten hit; she was armed with 18-ton guns. The "Captain," armed with 25-ton guns, fired eleven shots, and made four hits. The "Monarch," also armed with 25-ton guns, fired twelve shots, and made nine hits. I won't follow out the argument which Captain Colomb so ably brought before us, but I will just go to the results that he gives. By a simple argument he reduces those results to the results that would naturally be obtained had the vessels been firing at a target representing the side of a ship, and, putting it into an interrogative form, he asks, "Is it really then the case that at a moderate range of '1,000 yards under the most favourable circumstances a 'Monarch' can only 'expect to hit a sister vessel from twice to fifteen times out of every 100 shots?' that is to say, from one to seven and a half times out of the fifty shots that we are told would be quite sufficient to smash all our enemies. He also says, "In six minutes from the opening of her fire on the sister ship at 1,000 yards, she will 'have fired 12 shot.'" There is another thing that we have to consider besides the accuracy of our guns. I have no wish of course to detract from the capabilities of our seamen gunners; the fault does not lie with them: it lies partly with our artillery, and partly with the elements which we have not as yet been able to overcome. We have this to look at, that as the size of our gun increases, so we must expect the accuracy of the gun to decrease. If the "Monarch," carrying 25-ton guns, can only make this amount of accuracy in firing, we must of course expect our 38-ton gun and our 81-ton gun to be even less accurate in firing at sea. Then comes the point, supposing that this single shot, or these half-dozen shots, if you please, out of the fifty fired before the vessel becomes disabled, strike, we have to consider where they would strike, and what damage would be done to the ship that was struck. To say that those half-dozen shots would be quite sufficient to sink our enemy, I think is going a very long way towards saying that all the ships that we have been building hitherto are really so much money thrown away. We have been endeavouring to build our ships, if not absolutely unsinkable, at all events in watertight compartments, and with appliances and means for keeping them afloat. Mr. Scott Russell has told us, that if we only say we want it, he will build vessels for us actually unsinkable, and I believe that is perfectly within his powers; unsinkable I take it, he means, not only from the shot of an enemy, but from the blow of a torpedo or the ram of a vessel of similar size. Therefore, I am at a loss to conceive how we are to satisfy ourselves that we shall be able to do the necessary amount of damage to the enemy with the half-a-dozen shots with our big guns before they are disabled. I do not wish to take any alarmist view of this matter, but so far as I can see, I am really within the mark when I say, that after a very small number of rounds from one of our big guns, the possibility is that the gun may become for the time disabled; and that for the time is everything, because if we have to send our "Devastations" home from Sebastopol, or whatever other fortress they may be next employed against, to this country, or to Malta, or some other arsenal, to replace their guns, or even to revent them, which amounts to the same thing, I think we shall be in a very awkward position indeed. I have made these few remarks, because I think this question of the guns has been put very prominently before us, and is not by any means the least important feature of the lecture.

Mr. ROEBUCK, M.P.: I came here entirely ignorant of anything you (Captain Scott) were going to say. I came for the purpose of instruction, and I must say, I have been instructed to this extent, that I have been much alarmed. The gallant gentleman has proved to me by his lecture, as far as in a short time could

be proved, that we are in an utterly indefensible position, and one thing of all others which has struck me most, has been that the Navy which we have now, is not fully nor properly manned, and that it cannot be manned. Now what I should wish to learn in a succeeding lecture from the gallant gentleman is this. He points out certain defects in our Navy arising from want of men. Now has he any means to propose by which men could be obtained, because Government ought to be instructed by professional men upon professional subjects, and sailors, conversant with these matters, as the gallant gentleman is, are just those to whom we should look for instruction? Now I, as a legislator, should be very glad to learn what he would propose as to the means of manning our Navy, and rendering our men efficient for the purposes for which men are selected to be sailors; and teaching them what ought to be taught to each particular class of men, and how that particular class of men ought to be raised. If he would take that into consideration in his next lecture, and tell us what we ought to do for the purpose of manning the English Navy, I should be very much obliged to him.

Captain WILSON: I have read two papers on the subject in this theatre, which, if you will allow me the honour, I shall be very glad to send you; they will answer the question you have been good enough to raise. I know that it is out of order, but I omitted to touch on one point of the lecture which I hope I may be allowed to refer to now. I wish to say that I think Captain Scott did not give sufficient credit to the usefulness of young marines, and places too much importance on the old marines. Young marines are as good for fighting purposes as older men, in my humble opinion. In the old wars it must be remembered we had often soldiers on board our ships, who proved quite as good in every way as our marines. Sir William Napier states in his "Life," that he was embarked for some years on board the "Bellerophon" with his men as marines, and at the battle of St. Vincent, Lord Nelson, when Commodore in command of the "Captain," was helped on board the "San Joseph" by one of the soldiers of the 68th Regiment, who was one of the boarders. In those olden times, if we read naval history, we find soldiers spoken of in as high terms as the marines of the present day.

The CHAIRMAN: With regard to what has been said about the Officers knowing the duties of all the men on board, the idea always has been in our service that the Captain and superior Officers, although they may not be personally practised in the particular duties of the engineers and of the stokers below, would be worth nothing in their positions, if they did not know all about the duties of those over whom they have the charge. A Captain, I conceive, is no serviceable Captain in a ship if he is not himself personally able to judge of the duties of every man under his command, be those duties what they may. I may give one instance in support of the necessity in superior Officers of a practical knowledge of certain details. We may all recollect the Niger Expedition, which was an expedition up those rivers in Africa in a very bad, unhealthy climate. The loss of life from illness was very great indeed; so much so in the case of the engineers of one, if not of both of the steamships, that in order to get the vessels down the rivers, the surgeons (from the want of engineers) had to start and work the engines, in order to get the steamers out to sea.

Captain SCOTT: Commencing at the remarks made by Captain Wilson, I beg to say that I have not gone into the question of the relative values of young and old marines, because I have only dealt with general principles; but I shall be glad to go more into details on another occasion. Next time, and in continuation of the paper I have just read, I hope to put before you our war-ships, their needs, and the means of supplying them: I am quite sure that if we could stir up a little national enthusiasm, we should have a different feeling at our seaports from what now exists. We have already most valuable *nuclei* in Sailors' Homes for bringing together our seamen and coast volunteers. These Homes, which many now present have helped to establish, have been the means by which the *morale* of our men has been much improved, and their sobriety greatly encouraged; if we were to extend the use of those places, and to draw men together, giving them occasional papers and suitable readings, I think we might in a very short time provide our naval and mercantile seamen and our coast population with a strong patriotic feeling. Unless we, as a nation, are all firmly united with our seafaring coast population, we

should do little in war. Look at the Army, how very united it is on every essential point. We are proud of our Army, and one always finds that Army men are the very first to forward the best interests of the Navy; really, without such aid we should be nowhere. As to our defences, Captain Wilson has told us that when soldiers, in times past, have been embarked in our war-ships they have made very useful men, but the duties of sailors now are very unlike what they were then. Formerly the work greatly depended upon muscular strength; now it depends more upon skill, and therefore we must have well instructed men. We must not run the hazard of having to fight our battles with undrilled men. Remember, in the American War, how our vessels were sent off with untrained men, and were captured by the Americans. When and how was the tide turned? When the "Shannon," commanded by Captain P. Broke, and manned with a disciplined crew, who thoroughly understood their work, and would have followed their Captain anywhere, appeared off the Chesapeake River, then the "Shannon" took the frigate "Chesapeake" in a very short time. Happily, that war ended, as we all know, by our American cousins gaining their independence, and well it is for the freedom of the world that it was so. I only allude to this to show the mistakes we have made through want of preparation for war. I think that the Honourable Member of Parliament, who asked for information, will find in Captain Wilson's and Mr. Brassey's pamphlets, and in the discussion on Captain Noel's and other papers in this theatre, all the information he requires; but, with reference to his further remarks, I am going to show the insufficiency of our naval armaments, and how these armaments can be greatly improved, and I also hope to indicate the qualities required in our future fighting ships. At the present time we hear much about the need for building light, unarmoured vessels; but of what use will they be to oppose heavy war-ships, for our enemies will send their heavy war-ships to attack our commerce? Not long since, some of the most influential Frenchmen, speaking of what they would do in case of war with England, said that (despite the Declaration of Paris) they would leave our war-ships alone, and send *their* war-ships to destroy our commerce. I now beg to turn to Lord Denbigh's question, as to arming our merchant vessels. I think it of importance that we should utilise all the resources we have, but we should not attempt to put in the merchant vessels, guns which are so large that they cannot be carried without considerable alterations. I believe officers were sent round to ascertain whether our merchant steamers could carry heavy ordnance, but I do not think they were instructed to find out what extent of light armament such vessels could easily carry, and consequently they came back with the report that the vessels were unsuitable for carrying guns. As to making the necessary preparations for utilising our Mercantile Navy in time of war, there are very few men who have the technical knowledge of gun-mounting, and of the other appliances for warfare, to be able to grasp the subject,—to do so, and to efficiently carry out such preparations, you must have specially qualified persons. As respects the proposal to build circular superstructures, for the purpose of protecting heavy guns, I fear they would prove cumbersome, and would not keep out shot, because if the shot struck at even a very small angle, they would go right through. As to the question of unsinkability, there is no doubt but that it could be secured by means of cellular subdivision; and as to the value of the fish torpedo, the Austrians, who were the first to buy it, now consider that the ram is a far more efficient weapon. This seems the opinion of their Naval Constructor and their Minister of War, and I mention it by way of throwing light upon what we and other nations are doing. Lord Ranelagh asked about this sub-marine rocket. At the time that Mr. Hale brought it forward, the explosive effects of gun-cotton were unknown; but now we have every day fresh improvements in the manufacture of gun-cotton. The advantage of the Hale rocket is that whereas the fish torpedo requires careful launching, and the charge is exploded on impact about four feet away from the vessel struck by it, you may in Hale's rocket put gun-cotton or the strongest explosives in its front. (Lord RANELAGH: What distance would it go?) That depends on the size and weight. [The rocket was here let down its tube, and struck a shelf piece some feet off with great force.]

Captain BURGESS: You light the fuse in the rocket at first merely to start it.

Captain SCOTT: So you do in the case of the fish torpedo, and a very delicate operation it is.

With respect to the guns, Captain Price is perfectly right as to their insufficient endurance, and we have been continuously making alterations in them for some time past, and were an inquiry to take place, I am quite sure it would greatly benefit England by leading to the improvement of her war material. I have heard it said that the Committee of the House of Commons that sat on the guns have not done any good. We were, however, going on in a wrong groove, but, owing to that Committee, there was a complete change, and what progress we have made, is owing to their inquiries. The Committee that sat on the construction of ships have also done great good. Such inquiries awaken deeper interest in naval matters, and by bringing to light errors, enable us to go on in a sounder groove. Captain Price has done a great deal of good by bringing naval questions before the House, and not being a gunmaker, or having any personal interest in the matters he is endeavouring to push forward, his opinions are entitled to and do receive much respect. I venture to add that when I was employed by the Admiralty it was a pleasure to see the trouble that he took in instructing the guns' crews to use their new weapons. It has been asked elsewhere, Where are you to get thoroughly instructed Officers from? I do not think there are sufficient inducements to cause them to devote their time to professional work. If their time were thus spent, it would be much better for the interests of the Service. Our present system is to teach a few only of our Officers in the "Excellent," and the men are drilled to use the weapons in her; but they may have a weapon given them that they have not seen before. In times past, I have known loss of life to occur owing to being new to their weapons, and consequently uninstructed in their use. In one case a man took off the break, not knowing that it was intended to control the gun in a seaway. At night quarters another man was actually attempting to run the gun out while the Captain fired it. Were greater inducements held out, I feel sure a sufficient number of Officers would soon get the requisite instruction, and would come forward to teach all the men, including reserves and volunteers, thoroughly. I do not think that seamen, who are necessarily imperfectly educated, can ever teach modern gunnery properly. The work of gunnery teaching, combined with that of First Lieutenant, would give an Officer confidence when commanding his crew in action. To prepare for this he should always drill the crew at quarters, and not allow another voice to be heard, unless he gave a special order for some separate work. Every manœuvre should be performed under his direction alone; to do this well requires a Captain who knows precisely what the power of his guns and other weapons is, and what his vessel really can do under steam. To command and fight a vessel efficiently in these times requires a special and very high class of practical education; and we can only hope that our Officers and seamen will hereafter be as much distinguished by their superior skill as they have been in times past for their dash and seamanship.

The CHAIRMAN: I think we need not wait till his next lecture to thank Captain Scott for the very instructive paper he has given us. He has given us something to think about. Some of us may think that everything is not quite so black as has been represented, and may not despair of the present; but, at all events, nothing can be better for us than to know the very worst that can be thought of us so that we may think the remedies out, and be perfectly well aware of our difficulties, and thus learn the best means of overcoming them.

LECTURE.

Friday, 30th June, 1876.

ADMIRAL SIR HENRY J. CODRINGTON, K.C.B., in the Chair.

"THE MARITIME DEFENCE OF ENGLAND, INCLUDING OFFENSIVE AND DEFENSIVE WARFARE."

PART II.—OUR SHIPS OF WAR, THEIR ARMAMENT, &c., &c.

By Captain R. A. E. SCOTT, R.N.

INTRODUCTION.

ON commencing this second part of my paper, I wish to disclaim everything of a personal nature, and though I have in some instances particularized, it has been, and will be, should I again have occasion to do so, with the object of bringing before you more clearly the defects of a system which has acted injuriously upon the *matériel* as well as upon the *personnel* of our Naval and of our Mercantile Marine.

The state of the *personnel* has been so clearly brought before you by the valuable papers of Mr. Brassey, Captain Wilson, and others, following the lucid statements of General Collinson as to our unpreparedness, that I need only call attention to the fact, that while we have been slumbering, France has been nursing her marine, which contains nearly 70,000 well-disciplined seamen between the ages of twenty and forty, who either have passed or are passing through from three to five years' service in her war-ships. This force is double that of all our seamen and marines put together.

In Officers, France is equally well provided, having 5,000 captains of merchant vessels, who also have passed, or are passing, from three to five years' service in her Navy, and are therefore thoroughly efficient commanders, ready whenever their services are required by their country.

Our own reserve force comprises but few Officers, and those few insufficiently instructed in the art of war. Even the "Rainbow," commanded by Thomas Brassey, Esq., M.P., is indifferently armed, but is well supplied, however, with handspikes and tackles, with which guns cannot be accurately pointed, nor the crew trained to use the newer weapons.

I believe however, from the attention the nation is now bestowing upon maritime matters, a better day is dawning, and that our national armaments will soon be placed upon so sound a basis that the question asked in the very able leading article of the *Pall Mall Gazette* of the 11th February, 1871, viz., "What guarantees have we that under similar circumstances we should not fail in a way similar to that of France?" may be satisfactorily answered.

My own desire is to direct attention to what is *capable of improvement*; and as I feel sure that foreigners are well aware of our shortcomings, which are perhaps unknown to those who would gladly inaugurate a healthier state of things, I do not hesitate to mention what I think to be faulty, pointing out at the same time how it may be amended.

Permit me here to say a word on a point which is connected with the subject I am treating of, and which is of some importance to us, viz., the facilities given to foreigners to view our yards. This is desirable, otherwise England cannot continue to be the mart of the world; but while doing this, let at least equal facilities be given to our own Officers, and then I should have no doubt as to the result. We must remember also that our great engineering firms, who contribute so largely to the country's greatness and wealth, manufacture for peaceable as well as for warlike purposes, and that in case of war, we have the willing aid of these powerful companies. Besides, we have the advantage—a very great one if intelligently used—of knowing through them what progress other countries are making.

I now pass to the consideration of our naval power, its present improvement and its future development:—

1st. As regards new ships; and

2ndly. As regards the improvement of our present ships.

New Ships.

The smaller vessels should be sufficiently numerous for the varied duties which our wide extent of territory necessitates, viz., for putting down piracy and the slave trade, and for the protection of British subjects in all parts of the globe; such vessels, if not found sufficiently numerous in war time, might, as Mr. Brassey recently pointed out in this theatre, be easily supplemented by hired vessels. Hence we may safely devote all our energies to the improvement and completion of ships now building, and to the bringing up our present armaments to the requirements of modern warfare.

Our fighting cruisers—ships equally well adapted for single combat or for combined action in line-of-battle, and able to maintain the honour of the British flag at all times and upon all occasions—should consist, I think, of two classes: the smaller of between 5,000 and 6,000 tons displacement, and the larger of from 7,000 to 8,000 tons, or about the tonnage of the new cruisers "Nelson" and "Northampton," which vessels differ from both the classes I propose, in not being designed to fight with ironclad ships.

These two classes of ironclads, being largely built of steel, a metal which has recently been so greatly improved in strength and tenacity, would be of moderate draught of water and manageable size, would be fast, and take a powerful armament into action. Their cost in proportion to armament would be small, and, as the most efficient ship is the one which combines in the best proportions the needful qualities for warfare, I have thought it best to place my views—the result of careful comparison and long experience as to the relative importance of these qualities—before you, viz:—

- 1st. Unsinkability.
- 2nd. Ramming power.
- 3rd. Gun and torpedo power.
- 4th. Armour protection.
- 5th. Speed.
- 6th. Coal capacity or steaming power.

"Sea-keeping" I have not named, as all England's war-ships should be able to keep the seas in all weathers; coast defence ironclads seem to me to be an anomaly.

1stly. Unsinkability.

This should be the chief consideration of the Constructor; and I feel sure that my brother Officers go with me in thinking, that half or more of the modern thickness of armour on the *topsides* should be given up, and the larger portion of the weight of iron saved, be employed to strengthen the bottom of the ship, and to render her cellular subdivision more complete. The Navy will, I think, be glad to hear that Admiral Elliot's advocacy of the turbine has borne fruit; for even should the results of the experiments not lead to its introduction as a principal motor, they *may* call attention to the great importance of *rapidity of turning* (especially when an enemy may be charging), and thus lead to the engine for weighing the anchor being also utilized for the purpose of turning the ship.

In case of damage to the *rudder* by torpedoes or torpedo-boats, some appliance to take its place is needed for the safety of the ship against rams, &c., and a powerful means of clearing the vessel of water, is equally needed to secure the ship from sinking. The views which Mr. Griffiths has put forth of the capability of his *cased* screws for very rapidly discharging the water received through a leak (caused by the blow of a ram or otherwise), as well as other similarly promising plans, should be at once and very fully inquired into. The difficulties of preventing serious damage by torpedoes have been much over-estimated. In the experiments carried out at Portsmouth, the weak superstructure and bottom of the "Oberon" received, on every occasion but the last, less injury than was anticipated; and I think these experiments tend to show that a more *subdivided* and a *stronger* bottom would have precluded serious damage by ordinary torpedo-attacks. Further strength and resistance would be obtained by making every store-room and tank a water-tight compartment, and the increase of structural strength thus gained would materially add to a vessel's security against the blow

of a hostile ram. Looking at the long period the "Vanguard" was kept afloat after her thin side had been ripped by the "Iron Duke's" spur, the conclusion that *unsinkability* may be secured, seems fully justified.

Strength of bottom, would likewise prove a safeguard against serious damage from grounding, when perhaps pursuing (not flying from) an enemy's war-ship right under her own batteries. One of our ships, with a strong wooden bottom, went over a ledge of rocks in pursuit, and was safely bumped back again over it. Strength of bottom would also prevent the injury that might otherwise accrue from plunging fire, or from projectiles, or portions of them, striking a bulkhead, and being deflected downwards against the bottom.

2ndly. The Ram.

This has been aptly termed "the naval bayonet," and is a weapon which, if handled with skill and pluck, will prove invincible. Its special fitness for British sailors was referred to in my last lecture, and the Chief of the Naval Constructive Department of the nation which used it with such effect off Lissa, says of this weapon, when speaking in regard to the re-construction of three vessels of the Austrian Navy at the cost of one ironclad—that we, as the result of this cheap conversion, "now possess three rams, the most dangerous and secure weapons, I consider, and compared with which, the action and effect of the aggressive torpedo is, in my opinion, doubtful and insecure, and may easily endanger the ships of its own fleet."

Such then is Herr Romako's opinion of the relative values of the ram, and of the fish-torpedo which the Austrians were the first to purchase and experiment with.

3rdly. The Torpedo and Gun.

1. The fish-torpedo requires careful manipulation, and the dangerously high force which is essential to compress the air for working its motive power, has very recently resulted in one or perhaps two deaths of the skilled instructors teaching its manipulation on board the "Vesuvius"; the compressed air burst a torpedo in the Royal Arsenal, and occasioned a serious accident, and is, I fear, likely to cause still more serious results when handled by the less practised crews of the Royal Navy. This torpedo explodes by detonation, the bulk of the charge being at perhaps 4 feet distance from the object struck, hence the greater portion of the effect is expended in throwing up a column of water instead of cutting through the object aimed at. Until therefore the delicacy of this weapon, and the dangers and drawbacks attendant upon handling it, be removed, I cannot but concur with the opinion of Herr Romako as to its inferior value as compared with the "Ram."

The Harvey *towing torpedo* is simple and efficient, and far more easily and safely handled; it is exploded in actual contact with the object, the centre of the charge being within half the distance of that

at which the fish-torpedo explodes. Its range, however, is more limited.

I believe the fast steel torpedo-boat is destined to play an important part in future naval warfare, by dashing out from under the shelter of its protector and destroying the rudder, screws, &c., of the enemy; I think that a more simple machine than the fish-torpedo would be offered to our Government, if the *certainty* of a fair reward were to be held out.

The Gun.

In the early days of armour-plating, Colonel Inglis, R.E., conclusively established that one 68-pounder smooth-bore did as much damage as five 32-pounders, and I think that nearly similar results are obtainable from rifled guns; for instance, one 18-ton gun will produce an effect beyond that which can be obtained by the firing from three 12-ton guns.

The power of the 18-ton gun is sufficient for the penetration of the armour of any ironclad afloat within certain limits of range, but the 12-ton gun will *not* penetrate the armour of thickly plated vessels. Its shell also is weaker.

The superior value of a powerful gun which *will not fail* to damage the adversary against whom it is discharged, is obvious, and even those in favour of light guns, arrange for such guns being fired together by means of electricity, so as to endeavour, I suppose, to attain the same result as that which could be obtained with *certainty* by the more powerful weapon: this leads me to the important point of a high velocity as an essential for striking a hard blow. The blow struck by any projectile is proportional to its velocity squared, multiplied into its weight, and, consequently, if one gun discharged its missile with a velocity of 1,000 feet per second, and another gun a projectile of similar weight with a velocity of 2,000 feet per second, the blow given by the latter would be four times the force of that given by the former gun; hence we may deduce how the higher velocity of the German breech-loading 56½-ton gun enabled it to give a greater result than that which had been obtained from our 81-ton gun, notwithstanding the excellent construction of the latter.

This higher result seems to be due to the enlarged powder-chamber, and I believe that it is now contemplated to chamber our 81-ton gun to 18 inches, and to make the bore 16 inches diameter. Were the 18-ton gun to be somewhat similarly treated, namely, chambered to 12 or 13 inches, and its bore kept to its present size of 10 inches, its power would, I believe, be nearly doubled, and a like result would attend the chambering of the 35-, the 12-ton, and the smaller guns.

"Armed science," however, as represented by the artillery, who seem far more apt than the Navy in the appropriation of new forces, has already had a field-piece designed to attain the same advantage in velocity, as that given by the German breech-loaders. But for the Navy, in which it is doubly important to strike hard, little appears to have been done.

This leads me to the projectile. The present war weapon, or tool

with which our sailors will have to crack the side of an enemy, is made of cast-iron, and this brittle metal is pierced somewhat after the pattern of a sheet of postage stamps, in order to receive the studs, by which rotation is given and the projectile kept point foremost.

These studs are swedged in by powerful hydraulic pressure, and hence necessarily act as wedges to split open the projectile on impact.

The reason given for the introduction of the gaining twist was to reduce the strain on the gun on the shots starting, but the adoption of a slower-burning powder has now caused the greatest strain to be thrown upon the gun when the shot is nearer its muzzle, and thus has reversed the conditions, which caused the gaining twist to be adopted.

There is now *no advantage*, but the contrary, in continuing to rifle guns with the increasing spiral or gaining twist which necessitates studs, in fact, the supposed advantage was always infinitesimal.

Plate XIII, fig 4, S. a. A, represents the course taken by the stud projectile on first starting, through the bore of the gun rifled with the *increasing* spiral; the curved line shows the actual path of the iron-ribbed projectile in rising and centring itself easily in the bore of the gun, rifled with the *uniform* spiral, fig. 6, S. b. B.

The difference in strength of the service stud-projectiles between those of iron only is best shown in figs. 1 and 2 (O. S. C. Report).

The unfortunate result of the adoption of the gaining twist in causing loss of velocity, and consequently of penetrative power, is apparent from the accompanying table compiled from official reports. This loss of projectile energy, all the skill of Shoeburyness and the factories has been unable to restore. (See table A in Appendix.)

The Metal of the Service Projectiles.

As the Germans and the Brazilians are manufacturing steel projectiles for war-purposes, retaining cast-iron for ordinary practice in peace, I can scarcely imagine the cost of such superior weapons to be an insuperable bar to their introduction into the English Navy.

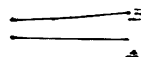
The poorest workman deems it the cheapest plan to provide himself with the best tools, and therefore buys those with a steel-cutting edge, for he finds he can perform much more work and with less toil, than if he were to use the poor cutting edge of cast-iron.

The projectile itself is merely a punching tool driven at a very high speed, and to manufacture it of a brittle material, is not the way to enable our sailors to retain their superiority in warfare. The toughness and strength which are found in steel, are needed to enable the shell to punch an enemy's armour and then to burst explosively, after penetration.

The charge placed inside plate-piercing shells is *exploded* by the heat evolved by impact. This effect can be delayed by wrapping the charge in flannel. *Cast-iron* shells usually crack on oblique impact.

Judging from the results of firing with our guns, I believe that if we were to avail ourselves of the fortuitous change brought about by the adoption of a slow burning powder, which has left our naval guns, from 35 tons downwards, with a very large excess of strength in the inner tube and in the thickness of breech, and we were, as already





indicated, to increase the size of the powder-chamber and its charge as far as practicable—the power of our naval guns would be so greatly increased, as to enable them to drive projectiles against armour-plates with *nearly double* their present force.

One of the most scientific of our artillerists has estimated that the studs of projectiles fired from our 25-ton guns have commonly to bear a strain of no less than 20 tons to the square inch, so that the fact of the studs being over-weighted and the studs themselves overstrained, admits of little doubt, even were the evidence of the fact not legibly written upon the studs and stud-holes, and proved by the compression of recovered projectiles, and the dropping of their studs on discharge.

The heavy copper wad, recently applied to prevent erosion or scoring of the bore of the gun, would be unnecessary with a better system of rifling: this wad must greatly tend to break up the projectile which, considering the brittleness of the metal of which it is manufactured, is a marvel of strength.

The recent firing of fifty rounds, at Shoeburyness, in one day, and then re-venting the gun, is set down as a great success; but as various delays occurred during the series of rounds fired, causing a mean interval of $4\frac{1}{2}$ minutes between them, and a wet sponge was employed, excessive heating of the gun was prevented.

I think the result rather tended to show the advantage of the naval pattern of gun-carriages, and the quickness and accuracy of pointing with the simple rack-training gear; though it likewise showed the danger of being dependent upon hydraulic gear alone, for both the hydraulic for lifting the carriage upon its rollers, and that for checking and controlling the recoil of the gun, were damaged, requiring in the one case $12\frac{1}{2}$ minutes, and in the other, 63 minutes to replace them in working order.

In the "Hotspur's" 25-ton, and other similar purely naval gun-carriages, preventer-gear is fitted, which can be at once resorted to, and these carriages have each two compressors, either of which is sufficiently powerful to hold the gun and control its recoil in any sea.

The rapid wear of the vent, to which this recent Shoeburyness experiment calls attention, is a serious evil, for it causes but a short life in action for the 38-ton gun, and a safe endurance of only 50 rounds under the most favourable circumstances; but what would be its endurance should the copper wads become displaced, or the gun have to be fired rapidly in cold weather?

I venture, however, to suggest whether such a gun could not be fired by means of a very strong electrical current passing through its closed breech-piece, or from a vent underneath the gun, either of which plans would probably stop erosion.

I now come to another important point, viz., the nature of the filling, called the *bursting-charge* of the projectile.

Experiments have conclusively proved the most effective bursting-charge to be gun-cotton, but the gaining twist gives its stud projectile an unsteady course through the gun, and hence gun-cotton cannot be safely used in our large guns as now rifled.

The action of gun-cotton is, however, being daily increased in intensity, and there seems little reason to doubt, that if it could be carried inside a shell through an armour-plate, it would, on bursting, shiver the ship's side or deck.

I will now call your attention to the effect which would be produced by special projectiles filled with gun-cotton.

Here is the model of a short mortar from which flat shells filled with 2 cwt. or more of gun-cotton, could be projected through the unarmoured sides of an enemy's ship—or this shell, a *flying-torpedo* as we may term it, could be projected so as to explode on falling upon the deck after passing through the unarmoured ends of modern iron-clads. (See General Hutchinson's Paper, vol. xi, page 40, Journal R. U. S. I.)

4thly.—Armour Protection.

Deck-armour offers many advantages, such as ease of repair, and being placed at an angle not readily penetrable, but the cumbersome *side-armour* which will be so difficult to repair if displaced, or even if much damaged, cannot yet be dispensed with.

The great point to be secured, is to reduce the length of the side-armour as far as possible, by judiciously lessening the number and increasing the size of the guns, to be protected by it; but this should be done so as not to impair, but rather to improve the ordnance-power of the ship. The inner circle, or citadel of armoured protection should be afforded by an armoured deck rising from some point at from 5 to 6 feet below the water to 3 or 4 feet above it. This would be in lieu of the under-water deck now in favour, and its comparative advantage is that "the cork of the bottle," as Capt. Wilmhurst aptly termed it, would be *above* instead of below the water-line. With an under-water deck, on the contrary, the shutters round the hatchways are liable to be shot through, and then the water passing through the ports or wounded side of the ship, would pour down these openings, hindering the working of her engines, and perhaps destroying her motive power by extinguishing the fires. *Upright side-armour* bracing the cross-armoured bulkheads firmly together and forming an enclosed armoured structure, will protect the guns and their crews, and during the operations of loading and pointing will afford security to the getting up powder and shell from below, and whilst passing these along to the guns; but this same armour should likewise be the outer, the armoured deck being the inner line of defence to the motive-power. A further protection will be afforded to her boilers, magazines, &c., by the coals and stores. And here I would advert to the dangerous fallacy advanced as to withdrawing the crews of the guns *outside* the armour to *within* it on passing an enemy. Such a course would most injuriously affect their "morale" in leading them to cower behind bulwarks, which after all, might tend to their more complete destruction in case of penetration of the armour. The huddling of the men together would prevent the working of the guns *within* the armour, and tend to create confusion, if not a panic; besides, the true principle of saving the lives of one's own crew and of enabling them to fire



VICTORY.

Fig. 1.

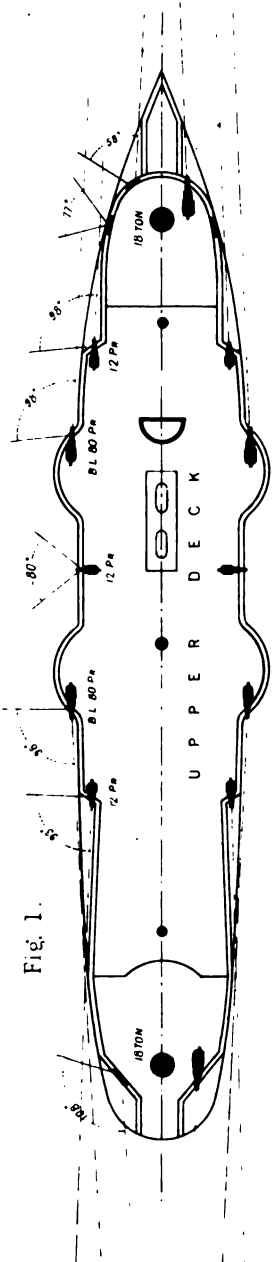
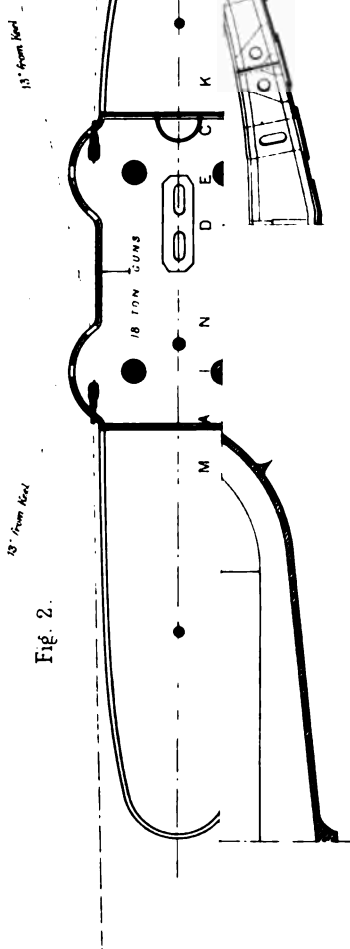


Fig. 2.



steadily and accurately, is to separate the guns widely apart, and to put bulkheads between them, to limit the destructive effect of splinters.

5thly.—Speed.

I need only say that a high rate of speed will enable the ship possessing it to overtake her enemy, and to place herself in the best position for continuing the action with the ram, and with guns discharging the flying-torpedo.

6thly.—Coal capacity.

This also is a very important element for securing success in warfare, for it enables a high speed to be maintained for a lengthened period, and provides for that quality which Admiral Selwyn has so happily termed, "sea-keeping."

In Part I of my paper I dwelt upon the *general* principles involved in England's Maritime defence, more especially as regards the *personnel*, and *defensive* warfare; I now propose to deal with the development of the *offensive* power of our fleet and the other points which are intimately connected with its efficiency.

Having described the weapons of offence and defence needed by a modern war-ship, I proceed to point out, firstly, the type of a ship in which these qualities can be, I think, best obtained.

First Class Ironclad Cruiser.

The first class ironclad cruiser would be of about the length of the "Nelson" and "Northampton," and by giving her a little more beam, keeping her floor flatter, and using steel largely, she could be built more completely cellular, have a stronger bottom and carry a heavier armament. The improved armoured deck I have already described as starting from the lower edge of the armour, and running above the water-line, the space underneath being filled with the reserve supply of coals. This deck would be carried forward to support the ram, and aft to strengthen the stern. (See Plate XIV, Fig. 5.)

Referring to the diagram of the "Nelson" and "Northampton" (now building), so as more clearly to indicate the method which would, I think, largely increase the offensive and defensive power of future cruisers, and render them more than a match for any war vessel afloat, I wish to point out that the aforesaid vessels are to mount four unprotected 12-ton guns, and two partly protected 18-ton guns on *each broadside*. The improvements I propose are, first to exchange these eight 12-ton guns for two 25-ton guns, which, according to the proportions of relative power, would be of equal force to the guns removed; to exchange the four 18-ton guns for four 25-ton guns, and to bring the armoured bulkheads much nearer, and join them in one solid structure with the cross bulkheads. I would then place one 25-ton gun forward and one aft, *outside* the armour, which would give a total of eight 25-ton guns, six of them fully covered by the same armour as that which forms a first line of protection to the

engines and boilers, the armoured deck being their inner defence. This arrangement would enable the proposed ships to fire five 25-ton guns on either broadside; three 25-ton guns ahead, and three 25-ton guns astern. The broadside of one of these cruisers, which I name the "Collingwood," would consequently be of more than double the power of that fixed for the "Nelson" and "Northampton; her bow and stern-fire more than treble; and the whole area covered by the "Collingwood's" fire more than twice that of these ships. This result is obtained by using the same small rear turn-tables as those by which the 18-ton guns in the "Sultan" and "Hercules," and the 12-ton guns in the "Shah," &c., are turned from port to port.¹

Second Class Ironclad.

The second class ironclad would be about the length of the "Raleigh," but with more beam and a flatter floor, and would carry four 18-ton guns under armour on the main-deck, and two outside on the upper-deck. If unarmoured, a similar armament to that described could be carried on precisely the same lines as those of the "Raleigh," but I should still prefer an increase in breadth, and greater flatness of floor, as more strength could then be given to the bottom, and a larger coal-supply carried. By this alteration, also, the 200 tons or thereabouts of ballast which are carried in the "Raleigh" could be advantageously dispensed with.

The plan of "projecting-side" was the result of my experience gained in the Channel Squadron in command of the "Research." It was laid before the Admiralty in January, 1867, and subsequently published in the *Engineer*. The projecting-side was devised in conjunction with the small turn-table already mentioned, as a means of developing to its full extent, the plan of mounting guns on the broadside, so as to bring up the power of our heavy broadside cruisers to at least that of turret-ships, which have the serious disadvantage of too few guns.

I notice that the Austrians have availed themselves of a similar plan for the "Tegethoff," which Mr. Reed described at the last meeting of naval architects as the newest and most important of the Austrian ironclads; and in speaking of the projecting main-deck battery, he says, "that in adopting the system I consider that the "Austrian Admiralty have acted wisely, for it has many very great "advantages, and no disadvantage of any moment that I have been "able to discover even in a seaway." Those accustomed to watch the rolling of ships at sea will endorse this opinion, but will not I think prefer the angular shape of the battery of the Austrian to the original curvature of side which tends to lessen a roll and also to prevent a hard blow from the sea such as would strike against any angular projection

¹ The least number to secure fighting efficiency is about one plate-piercing gun to every thousand tons of the ship's displacement, the guns to be of the following relative sizes, namely:—

4 18-ton	guns for 4,000 to 5,000 tons.	
6 25-ton	" " 6,000 to 7,000 "	
8 35-ton or 38-ton	" " 8,000 to 9,000 "	R. A. E. S.

(Plate XIV, fig. 7.) The "Tegethoff" is one of the most powerful broadside-ships afloat, if her guns be, as Mr. Reed says, of 27 tons weight. She partakes, however, of the disadvantages common to all broadside-ships, viz., of having a very confined arc of training for her guns, only one heavy gun bearing through an arc of 100° ahead, and only one gun through 100° astern. In the general arrangement of guns and armour, the "Tegethoff" is very similar to the "Téméraire," but the latter mounts, in addition, one 18-ton and one 25-ton gun, each in a fixed turret on the upper deck. (See Plate XV, vol. 17, Journal R. U. S. I.)

Before endeavouring to give you a glance at a naval action, I will briefly describe the differences between a broadside- and a turret-ship. The guns of the broadside-ship are always ready for action, and can be fired without danger of blowing away your own men, or any portion of your own ship. Heavy broadside guns are mounted so as to be pointed with the greatest nicety by hand-power on motions or signs from the captain of the gun, who, keeping his eye fixed upon the object he is aiming at, can fire the instant the enemy rolls, and exposes her unprotected bottom. Shot may then succeed shot with great rapidity and accuracy. Nor is one gun hindered by the loading or firing of another, except as regards "smoke." This drawback of smoke indicates the necessity for giving up the continuous popping from small guns, and for increasing the power, and lessening the number of the guns. It also indicates the value of a smokeless powder especially for non-piercing-plate guns, so as not to hinder the firing of the heavier ordnance.

But here let me add, that no large ship can be properly armed unless she has a suitable proportion, relative to her size, of light, quick-shooting, and accurate guns for specific purposes, viz., to ward off torpedo-boats, and to do the work of counter-mining with flat-fronted shells filled with gun-cotton; also to clear the decks of an enemy, and to destroy a mosquito fleet whether intending to attack with torpedoes, or by boarding, or by both combined. (See Appendix, table B.)

A well-arranged broadside-ship of the type proposed would secure what Admiral Selwyn advocates, viz., "Having a gun battery protected by the same armour which protects the ship;" and likewise what Sir Spencer Robinson truly deems most essential, viz., "the protection of the uptakes and crowns of the boilers, and of the motive-power." (Plate XIV, figs. 3, 4 and 5.)

The turret-ship, on the contrary, carries a massive weight of turrets to protect her guns, communicating by armoured trunks with the under-water and other decks. It, however, affords a better protection to the guns, gun-carriages, and gunners than any other adopted plan. It also possesses the advantage of central position, and of carrying the heaviest ordnance at a great height above the water. This is undoubtedly a great point, *especially in rough weather*.

On the other hand, the enormous weight of the turret and its guns cannot be pointed upon an object by hand-power, and, consequently, requires steam to intervene between the hand and the pointing-gear of the gun. The result is, that an interval of time elapses and a consequent

loss of accuracy, and this is further increased by the sights being placed upon the top of the turret some feet above the level of the gun. This, perhaps, is what Captain Price recently referred to in speaking of the anticipated inaccuracy of the 81-ton and other large turret guns, and not to any gun when mounted on the broadside carriage on which the 38-ton gun was fired on the practice ground at Shoeburyness. There is the further disadvantage and danger of having to fire over the deck without any *guide* for laying the guns *even by day*—so that a hasty shot may cut away a mast, rigging, and boats, or be sent through the deck, should the gun be fired ahead or astern with *depression*.

The "Monarch" has two 12-ton guns under her forecastle, the crews of which are, in my opinion, exposed to nearly as much danger from their own guns as from those of an enemy—an opinion in which our Constructors seem to share, for no guns are placed on the decks of the later turret-ships.

In a former commission of the "Monarch," a shot was fired, which, just passing over the Captain's head, sent the wire shrouds of the mizen-mast flying in innumerable splinters. This leads me to doubt whether wire rigging may not prove as prolific a source of danger in action as the firing of studded shell across the deck.

Lastly, there is the want of light guns, which is a very great drawback to the efficiency of a fighting-ship, and one which might lead to the prevention of accuracy of aim, if not to the silencing of her heavy guns by the maintenance of a continuous fire upon the sighting, ports, and the loading arrangements of the turrets.

The smaller vessel drawn here (see Plate XIII, fig. 5), which I call the "Victory," may be taken to represent a second-class armour-clad, carrying six 18-ton guns. In single combat, her broadside power would equal that of the "Sultan" through an arc of 130° , but for the remaining 230° it would exceed it twofold. Supposing that the "Victory" had forged ahead or dropped astern, and were to fire flat-headed steel shell, which are not deflected like round-headed shot on touching the water, and would penetrate at an angle of 66° from the perpendicular, she would be pouring in three 18-ton gun shell and receiving the fire of only one 18-ton gun, which, if the angle were 40° from the perpendicular, would fall harmlessly from her side and from her armoured cross-bulkhead.

Should the "Victory's" shell not explode on striking the "Northumbria's" side, it would certainly sweep her decks, and if it did little previous damage, it would probably bring up against the armoured bulkhead and explode, or be deflected downwards through the crowns of her boilers or through her engine-room.

Tired of this unequal combat, the "Northumbria" puts her helm down so as to bring her broadside to bear; but before she has steadied herself by reversing her helm to stop the swing which would be fatal to accuracy of fire, the "Victory," which has also put her helm down, comes flying onwards and rams her well forward to escape the danger of any towing-torpedo.

I think that I have now conclusively shown—

1stly. That the broadside ships I have proposed, viz., the "Collingwood" and "Victory," by the use of the same means as those employed to work the heavy guns of our present broadside armour-clads, can be placed upon more than an equality with turret ships.

2ndly. That armoured bulkheads, to protect from raking fire, are of little value, unless the armour is joined at the two other sides so as to complete the enclosure, as already shown in the "Collingwood" and "Victory."

3rdly. The inefficient protection of plated decks wholly under water.

I need scarcely enlarge further upon the disadvantages attendant upon the present type of broadside ship. Those who have commanded such ships in the Channel squadron are aware of these disadvantages and the difficulty of keeping their guns bearing upon any object, owing to the present restricted arc of training. This restriction is very damaging to efficiency, as broadside guns can so seldom be fired when steaming in a squadron. Even in single actions, when a ship can manœuvre with freedom, and fire without fear of striking a friend, to be forced by the confined arc of training to fight abeam or nearly so, and perhaps rolling heavily in the trough of the sea, is not the way to secure victory.¹

The having fewer and larger ports has been urged as an advantage, but in single combat, an enemy would only be opposite one port of each projection at a time; were the action a combined one, the great importance of being able to bring one broadside to support a hard-pressed consort, whilst engaging an enemy with the other, or to fire past a friendly ship, must be apparent to all naval men. The ports in the projecting rounded battery would also enable the captains of the guns to obtain a wide field of view, and hence to keep their guns bearing upon any enemies round the whole sweep of the horizon. (Plate XIII, fig. 7.)

Improvement of our present Ironclads.

Permit me here to mention what Austria is now doing, viz., replacing the wooden sides of three of her ironclads with iron sides and adding additional armour in vital places—a conversion which Herr Romako states—"will not cost more than the building of "one ironclad." I venture also to quote from *The Navy* of May 13th, 1876, Mr. Reed's words: "The authority of the naval architect "comes in, I apprehend," in stating what qualities are, and what qualities are not, procurable in a ship, and that their opinion as "to "the value of ships for sea-going and fighting purposes are quite "subordinate to the opinions of Naval Officers."

1st.—The Sultan.

This ironclad, at the time she was equipped, was considered as one of the finest, and is certainly one of the best-built vessels in the world. Commencing with her bottom, the 600 tons of scrap-iron and

¹ The adherence to the old style of sailing-ship broadside-battery sacrifices more than half of the gun-power. Broadside guns are only effective through an arc of from 66° to 76°, leaving upwards of 100° of total inefficiency.

cement placed there, is now so much dead weight, and therefore a source of weakness, and must tend to strain the structure where it is comparatively light, viz., between the armour and the bottom, on the vessel's receiving any shock from ramming, or being rammed. This dead weight, which if the vessel took the ground would risk her destruction, could be advantageously replaced by a cellular arrangement, carried out somewhat as Mr. Boolds suggests. The cost of putting in 500 tons of such strengthening, he estimated at £20,000, but our own highly skilled Constructors would, I believe, give equal strength by putting in less material, and at less than half this cost.

To balance the removal of the dead-weight from the bottom, and the carrying up of the cellular structure above the water-line, the cumbersome top-armoured structure, weighing, if I mistake not, 300 tons, should be removed, so as to leave a clear deck and an open view fore and aft for efficiently handling the ship.

With this structure I would sweep away its two 12-ton guns and turn-tables, which would be in the way of working the sails, and utilize the turn-tables for the two 12-ton bow guns (which are now arranged to fire ahead only), so that they would each work two ports, and thus command a fire from ahead to abaft the beam. In the stern, abaft the armour, another 18-ton gun, sweeping round the stern and crossing fire with the bow-guns, could be easily mounted on the main deck on each side. This with the necessary strengthening would weigh upwards of 80 tons. The result of the change would be a saving of nearly 500 tons in weight and a much stronger and better arranged ship, together with a fifth 18-ton gun for broadside-fire.

The five ships of the "Audacious" class could be somewhat similarly improved, viz., they could mount six 18-ton guns, with shortened slides in their main-deck batteries, instead of six 12-ton guns, and be provided with two other 18-ton guns outside their armour, viz., one at the bow and the other at the stern, their upper decks being locally strengthened; the ships would thus discharge five 18-ton guns on the broadside, and the danger of the bursting of a single shell, or of the vessel's catching fire, in the central battery, and thus stopping the firing of *all* her guns, be prevented.

The armoured structure upon the upper deck, weighing about as much as that of the "Sultan," could then be swept away and the ballast replaced by cellular strengthening. This alteration would remove a weak superstructure, would save nearly 300 tons in weight, and would enable a much larger coal-supply to be carried.

Both the "Sultan" and the "Audacious" class should be provided with suitable light upper-deck guns, mounted upon slides, 2 feet shorter than those now adopted. See Plate XIII, fig. 6.

The "Bellerophon" is deficient in bow-fire, and should be supplied with two 18-ton guns, mounted in indented ports, *outside* the armour of her main deck, and at least two more 18-ton guns to replace 12-ton guns in her main-deck battery *within* the armour. The two $6\frac{1}{2}$ -ton guns on the broadside of the upper deck should be done away with.

This vessel, from her fine armoured tower, would make a capital flag-ship from which to direct a squadron.

The "Minotaur" class are well built vessels, strong in the bottom, and showing, I believe, no signs of incipient decay. Their upper decks are firmly braced, and with local strengthening could easily carry four 38-ton guns, mounted on the same plan as the gun at Shoeburyness. On the main deck, so as not to add greatly to the total weight, a few powerful breech-loading 80-pounders, capable of piercing the thinner armour-plates, might be mounted. These, with some anti-torpedo 12- or 20-pounders, would render the "Minotaur" class, powerful ocean-cruisers. As their proposed main batteries would be on the upper deck, they might take in a very large supply of coal below. In war-time, the spacious decks of these vessels would be valuable for housing and lowering torpedo-launches for an attack; and this room would be equally valuable for working the Harvey and other torpedoes.

The "Minotaur" class would prove most serviceable for laying out light telegraph-lines; and for making the electric and sound-signals already suggested as a means of communication between our cruisers, mentioned in Part I. As first-class troop ships, they would be unmatched, and just the vessels to fight their way with the troops which the author of "The Army Question, 1876," considers might be used "in support of an ally with extraordinary effect by striking at the "communications of an enemy so directly as to give it the effect of "a much greater force."

I will only refer to one unarmoured vessel, the "Inconstant," as her 12-ton gun-carriages are placed upon slides which are too long and two feet too far in-board; this consequently interferes with the passing of powder and shot behind them. On the other hand, from her guns being so far in-board, the sights for pointing them are blocked by a slight roll, and the fire and smoke from the discharge are not carried sufficiently far from the ship's side. This vessel is also deficient in bow and stern-fire, which might easily be given.

I need not go further in enumerating the improvements which could so easily be made in our existing ships; but I do wish to urge that our coast-defence armour-clad ships should be made efficient "sea-keeping" vessels.

What is now wanted, however, to carry out improvement, is the vigour which Captain Coles threw into the advocacy of the turret, and like him, for us to throw aside old forms of construction which modern warfare has rendered obsolete. Mechanical and technical knowledge is wanted; the younger Officers might therefore at once, while in the full vigour of their activity, pass through the Shoeburyness course side by side with "armed science." They would thus gain a far better knowledge, both theoretically and practically, of the relative values of armour and guns, than is now possible for them to do.

Foreign military governments pay the expenses of their Officers, and secure admission for them at our various trials of ordnance and armour. The British Government places the naval Officer on half-pay, puts few facilities in the way of his acquiring information, and allows him to go at his own cost to these experiments. Besides the advantage of working side by side with a Corps necessarily better

educated than his own, the naval Officer would learn at Shoeburyness what cannot be learnt on a movable platform in harbour, viz., how to lay a gun with exactitude, for he would be enabled to observe the result of his own firing day by day, as the precise spot where each shot struck is measured and marked down; his errors would thus be corrected, and steady improvement be made.

To give a more perfect knowledge of their weapons to the whole Navy, as well as to instruct the unttaught masses of our coast population, a larger establishment than that at Shoeburyness would be needed; no better place could be found than the Crosby Sands off Liverpool, adjoining which a *dépôt* for the marines could be advantageously formed, and this corps, now 500 or more below its nominal strength, and having only a sufficient number in barracks to keep up the supplies to the ships in commission and to discipline recruits, could be rapidly augmented from the neighbouring counties and from the north of Ireland. Seamen, fishermen, and boatmen also, would be attracted to such an establishment, and, were due encouragement held out, would quickly take an interest in and learn their duties, and being then passed into the drilled Reserve, would be ready for embarkation on board our war-ships.

I have now endeavoured to show how *thorough* instruction could be imparted to our naval Officers and seamen, before being embarked in war-cruisers for more practical work, and I have indicated the qualities which are, at the present day, needed in our war-ships.

Permit me now to express a hope, that more attention may be hereafter directed to those improvements, which though costing little, as Mr. Brassey recently remarked, while the vessel is under construction, would add greatly to her efficiency when built. I have likewise endeavoured to show how the vessels which *are* built might, together with their armaments, be improved, so as more fully to meet the requirements of modern warfare.

In my first lecture I pointed out the necessity for embodying in one comprehensive Reserve-force the whole of our able-bodied seafaring population, and I indicated the means by which this could be effected; and I also showed how our vast mosquito fleet of river steamers, steam-tugs, &c., could be utilized for coast defence. I likewise indicated how our war-cruisers and merchant-steamers could act together for the preservation of our commerce, and for destroying the foes of our country, and I showed the advantages of more extended telegraphic communication.

In the discussion which followed, the growing influence of sailors' homes upon the *morale* and patriotism of our seamen was adverted to by me. May I now add that these sailors' homes would prove valuable *nuclei* for the diffusion of that public spirit which it is necessary to awaken, so as to stir up the slumbering enthusiasm and the great energy of our hardy maritime population; thus moved, it would find a pleasure in being intelligently taught to handle the latest weapons of war, and perhaps a still keener pleasure in using them in its country's service.

The little cloud in the east is extending, but we may trust that the time for action will find us not unprepared for the high destiny assigned us in "the Book," which our gracious Queen acknowledged to be the foundation of our national prosperity, and wisely use at once the ample means with which the *Giver of All* has so richly endowed us.

Then, whatever empires have passed away, or may be overturned in the coming struggle, we shall be found still occupying the high position of "Queen of the Ocean," and using our power, not only for the benefit of our own people, but also for the maintenance of right throughout the world.

APPENDIX.

Table A.—7-inch gun competition. Projectiles with hemispherical ends. Committee pattern. Mean of all rounds fired. Shot.

Guns.	Initial velocities.	No. of rounds.	Elevation.	Means.			Weights.	
				Of all ranges.	Difference of ranges.	Reduced deflection.	Of powder.	Of shot.
	Feet.		°	Yards.	Yards.	Yards.	Lbs.	Lbs.
Iron ribbed shot (long bearings)	1,594	15	2	1,585	17·7	1·1	25	110
French studs	1,529	..	..	1,473	62·2	1·9	..	..
French (Palliser studs)	..	10	..	1,446	19·9	2·0	..	100
Shunt	1,510	..	..	1,399	29·6	1·0	..	110

Table B.

The complete armaments of the "Victory" and "Collingwood" (improved broadside ships) would be as follows:—

"Victory," 2nd Class Cruiser.

No.	Description.	Weight.	Ship's displacement.
		Tons.	Tons.
6	18-ton guns	= 108	} 5,000 to 6,000
4	64-pounders	= 13	
6	12-pounders	= 3	
16		124	

"Collingwood," 1st Class Cruiser.

8	25-ton guns	= 200	} 7,000 to 8,000
6	4-ton guns	= 24	
8	12-pounders	= 4	
22		228	

Table C.

In the following table I have endeavoured to show the sizes and numbers of guns which would be suitable for each size of vessel.

No.	Description.	Weight.	Ship's Displacement.
		Tons.	Tons.
4	18-ton guns	72	} 4,000 to 5,000
2	3½-ton 64-pounders B.L.	6½	
6	½-ton 12-pounders B.L.	8	
12		81½	} 6,000 to 7,000
6	25-ton guns	150	
4	¼-ton plate-piercers B.L.	16	
6	½-ton 12-pounders B.L.	8	
16		169	} 8,000 to 9,000
6	35-ton guns	210	
2	38-ton " U.D.....	76	
6	4-ton " B.L.....	24	
8	½-ton " 12-pounders B.L.	4	
22		314	

¹ A 4-ton gun was manufactured for India in lieu of the 64-pounder.

The last armament would be for special fighting ships, and could be well carried on the 8,490 tons displacement assigned to the "Ajax" and "Agamemnon," in lieu of the four guns which are intended to constitute the armament of these vessels.

The CHAIRMAN: The subjects that have been brought before us to-day by Captain Scott are very extensive and require a great deal of thought. I hope, and think that we shall find some gentlemen present who are willing, as well as we know they are able, to make remarks upon them, and to enlighten us still further with regard to some of the details which have been brought before us.

Commander W. DAWSON, R.N.: The paper, as you, Sir, have already remarked, extends over a great variety of subjects, so various and so large, that it would be improper for any one in my position to occupy the time required for an attempt to discuss them all. I have known Captain Scott's ideas for a great number of years on the question of ships' armaments. I have very often differed from him very widely indeed, but I have generally found that when I have subsequently taken the trouble to study more attentively the particular question on which we differed that Captain Scott was generally right, and I was generally wrong. Under those circumstances I feel rather a difficulty in rising to discuss a paper, the criticism of which must be to find out the faults, and not to eulogise the good points. It is full of good points—full of instructive matter for deep thought, which will profit us all not only in the hearing now, but in thinking them over quietly at home. I will deal simply with the question of the offensive powers of ships, leaving the other very tempting questions to be found in this paper. Any one who studies the relative armaments of our ironclads will find that from the first introduction of ironclads to this day, there has been a constant diminution in the gross tonnage of the ordnance carried, and therefore of the offensive power; it becomes therefore an important question to decide in what way this diminished weight of armament ought best to be distributed. The 18-ton gun is a very serviceable weight, and I

think it is capable of having its perforating power largely augmented, without any material addition to its eighteen tons of metal. I take that gun as a standard of weight to start from, and I would suggest to Captain Scott that his advocacy of the 25-ton gun is, in my judgment, not a good one, inasmuch as the 25-ton gun is generally looked upon as one of the least effectual guns for its weight that we have. I am speaking, of course, of its power in reference to its weight. Are there no means of increasing the perforating value of the 18-ton gun except by doubling its weight? When engineers wanted to double the power of the steam-engine, what did they do? Did they take the weight of the original engine and shafts and boilers, and multiply them by two, and then build an engine of double the original weight in order to produce double the power? Is not that something of the way in which ordnance manufacturers proceed? An 18-ton gun, throwing a shot with "decidedly the lowest velocities," is found incapable of doing the required work. We take that 18-ton gun, and multiply by two, and turn out a 35-ton gun. We then find that a 35-ton gun, with "decidedly the lowest velocities," is incapable of doing the work, and we multiply that weight by two, and we have an 81-ton gun. Why is that 81-ton gun wanted? Because a "low velocity" 35-ton gun won't do a given work. Why is the 85-ton gun wanted? Because a "low velocity" 18-ton gun won't do the work. The work to be done by the shot is to perforate a given thickness of armour. What are the properties required in a perforating shot? A sufficient weight and velocity. Why then may not sufficient weight and velocity of shot be projected from the smaller gun by some ingenious arrangement, just as the engineer has got increased work out of the same gross weight of steam engine? That is a question which I think ought fairly to be faced. It seems a very unintelligible brute force sort of way, that of simply multiplying the weight of the gun by two, when you want to get more work done by the shot. There must be, and ought to be, some way devised by which more work might be got out of shot projected from guns of the existing weight. Is it that the bore of the gun is not large enough or small enough? Then why not make it a little larger or a little smaller? Why cannot heavier and longer shot be got out of it? or why cannot the shot be driven out of the gun faster? What obstructs the egress? There are several causes of obstruction. Some years ago, some competitive guns were compared, and it was discovered that when shot of the same diameter and weight were driven from guns with different rifling appendage, one particular rifling gave "*decidedly the lowest velocities.*" The rifling appendages which were upon that "slowest velocity" shot are precisely the appendages which we now have on the shot, which fails to perforate when discharged from our present 18-ton gun. Why should you deliberately stick to a shot which the late Ordnance Select Committee reported to have "*decidedly the lowest velocities,*" when you want increased perforating power; why, again, should you not increase the weight of the shot in the 18-ton gun? It is only 400 lbs. weight; why not make it 800 lbs. weight, if required? Because the shot must be so much longer? What is the harm of length? The shot will require more spin. If it requires more spin, there must be a sharper twist in the gun. If there is a sharper twist, you must have stronger rifling appendages, or a longer bearing and greater grip in each groove; but the grip in the groove is only one inch; if the shot be ten feet long or two feet long, it has still but one inch grip in the groove. If the shot be 100 lbs. weight, or one ton weight, it has still but one inch grip in each groove. That is quite contrary to all mechanical science. In proportion as the work to be done by the rifling appendage is greater, there ought to be a longer bearing to perform that work. Supposing that instead of one inch stud in each groove doing the rotating work of the 400 lbs. shot, you could put in fifty studs, you would get a fifty inch bearing—the whole length of the cylindrical parts of the shot. By dispersing the effort of rotation over the whole length of the shot, you would be enabled to give the grooves a sharper twist, so as to rotate a much longer shot, and to fire a much heavier projectile with greater space for a much larger bursting charge, and with much more perforating force. There is one direction in which it might be possible to make improvement. But there is another advantage in a longer shot, which is this:—that the longer the shot the more regular is the combustion of the powder in the rear. The longer shot seems to come out of the gun in a steadier way, so that the combustion of similar charges of powder is

more nearly similar. It is quite true that the powder-pressure goes up higher, but there are not those oscillations of pressure which have been so very disturbing to the minds of all artillerymen. That is an obvious advantage in increasing the length and weight of the shot. Then we may increase the size of the chamber. In our younger days, the chamber used to be made smaller than the rest of the gun; but now it has been discovered that by making the chamber larger and the cartridge shorter, a better combustion of the powder is obtained. There are, no doubt, other ways and means which might be devised by which guns of given weight might be made to do more work, so as to perforate greater thicknesses of armour. As individual guns are doubled in weight, there must be a corresponding reduction of the number of guns carried by each ship. Four 18-ton guns are roughly equal to one 81-ton gun. Now, supposing the shot from both guns alike capable of perforating the ironclad attacked, then I would say that the four guns with the four pair of eyes aiming were far more likely to make hits than the one pair of eyes with the one 81-ton gun. I wish to bring this very prominently before your minds, that firing a gun in a sea-way, and hitting the object with the shot, are two different things, and that it is a very small proportion of the shot which are fired, that do hit; therefore, to put an 81-ton gun in place of four 18-ton guns is simply to reduce your chances of hitting four times. It is a question of common sense; but, at the same time, of nautical experience. It is one thing to fire from a moving platform at a moving object at an unknown distance, and quite another thing to hit it. There is no look-out man at right angles to the range, and whilst those in rear of the gun are thinking that the shot is falling short, it is perhaps passing over the object, and while those in the line of fire think that it is going over, it may really be falling short. These things must be regulated by a certain degree of attention to the doctrine of chances. If we are only to have a given weight of armament, it would be preferable to have four 18-ton guns rather than one 81-ton gun, always supposing, of course, that perforation is secured. Therefore, I say, attention ought to be more decidedly directed to improving the perforating force of the smaller gun so as to get more effective work out of a gun of a given weight. There appears to have been a recent experiment at Shoeburyness, during which a 35-ton gun was fired at intervals one hundred times. I do not wish to make any imputation upon any one; but, as a matter of human nature, I venture to suggest that a gun-manufacturer who is testing his own gun will naturally endeavour to show off its special merits. An independent authority, testing that gun, would, on the contrary, endeavour to find out its demerits. Now, you have the gun-manufacturers trying the guns they have already made, and trying them under the equivocal circumstances that those guns are doubted by the sea-artillerymen who have got to fight with them. It would be far more consonant with human nature, and more satisfactory to the Navy, if a doubtful gun was tested by independent persons, instead of being tried by the gunmakers, who send down to Shoeburyness a squad of very experienced and very careful nurses, who have had great experience in nursing doubtful guns in all sort of ways—so much so, that the gun itself is popularly called an "infant!" It requires a certain amount of nautical experience to ascertain what would be the consequence of 2-inch cubes of hard gravel being fired out of a 35-ton gun over the decks of friendly ships and open gun-boats; and as to what would happen if the wrong powder was employed. These are matters of experiment upon naval guns of which naval men are the proper judges; and I would suggest that experiments of that kind to be at all relied upon, ought to have been done something in this way:—to telegraph to the Admiral in command of the fleet in the Mediterranean to order the "Devastation" to fire a hundred rounds from one gun in such a manner as would simulate to the best advantage the conditions of a naval action; and that a committee of naval Officers from that fleet, taken as they are without any direct communication at all with the War Department or Admiralty, should devise and carry out a scheme for firing one hundred rounds as in a supposititious naval action, and for observing very carefully the effects on vessels in the line of fire and upon the gun. Supposing the results to be what they ought to be—perfectly good—I am quite sure all naval men would be thoroughly satisfied with such a report; but I do confess from my information as to other experiments tried in the same way, that I do not think an experiment tried by a gun-manufacturer upon his own gun, and

carried out by experienced ordnance nurses, does produce the same amount of confidence amongst seamen as if the experiment on a naval gun were conducted by somebody else.

General COLLINSON, R.E.: I think we may congratulate the Institution and the country on the general tone of these discussions, going, as they have been going, in the direction of showing the advantage of being prepared for offensive as well as for defensive warfare. We seem to have begun to acknowledge that the real problem put before the Army and Navy in war-time, is not so much the defence of England only, or the fighting of a naval battle only, as to bring the war to a satisfactory conclusion in some way or other. I think also that English people are beginning to understand a little more clearly that these islands are the citadel of our Empire, and that our best policy in warfare is to put that citadel in an efficient state of defence, so that all our active offensive weapons can be employed against the enemy. I heard an expression used by a brother Officer of mine the other day, which, I think, is a very happy one,—that the marine forces are the right arm of England and the land forces are the left arm of England. We know a man generally uses his right arm to strike out; and therefore I think it is a satisfaction to feel that the Navy are taking up their part in warfare more with that view of their work. We also know that a man generally uses his left arm for defence, but also that he is quite prepared to strike out with it when necessary; and I may say I think the Army is considering its duty in that respect also. Viewing, therefore, the Navy in the light chiefly of a great offensive weapon, I venture to suggest to Captain Scott that there are two points in his classification of the power of a war-ship in which he might add to them with advantage. One is—the power of manœuvring—the power of turning the ship; I presume that would be most clearly expressed by the diameter of the circle in which a vessel can turn. The second element in the strength of the ship, which I think all naval men ought to include in their calculations, is the crew, not only as to numbers but as to efficiency; and I think from what we have heard of the power of rams, and guns, and ships to-day, we shall feel that after all, a great deal depends upon the efficiency of the crew, and that it will always be a great satisfaction to the British nation to feel that it is so. Now I venture to make a suggestion to the naval men present in considering the subject more particularly of defensive warfare. It is not often that the Army can make suggestions to the Navy, or that the Army considers itself a little better prepared for war than the Navy; but I do think the War Department has made a very great stride in this last year, in their mobilisation scheme, by which, on any declaration of serious war, the whole of the land-forces of the country will be assembled in different positions in the country most suitable for its defence; and also that some, if not all, of the army corps will be quite prepared in their equipment of men, horses, guns, and stores, to proceed on any expedition. But the part of the scheme to which I wish to draw the attention of naval men is, that the coast-line of England is intended to be divided into districts, and that in the mobilisation-scheme, certain Staff Officers and certain troops will be appointed to each district, who will be responsible for all the defensive elements in that district. I will suggest, in taking up the question of the naval defence of these islands, that that idea should be carried out as to the coast-defence; that it should also be divided into naval districts, which may very properly correspond with the military districts, and that an idea should be formed of the number of coast vessels armoured and unarmoured which would be necessary for the defence of each district, and where the armoured vessels are to be obtained, and where the unarmoured vessels are to be obtained; that is to say, where you can put your hand upon merchant steamers, river steamers, and coasting steamers, suitable as an auxiliary defence, and how many would be wanted, and where these vessels could be stationed at once in time of war as the centres of the naval defence of the coast; and, more especially, what number of men you would require for the working of these vessels, and how you will be able to get them out of the fishermen and seafaring men on the coast of England. I think if we could get that further step in the naval defence more clearly laid down, as it has been in the military defence, we should put this citadel of our Empire in a more secure state, and leave the active fleet and the active army more ready for offensive operations. One other point I wish to allude to with reference to something said upon the subject of testing the guns at Shoe-

buryness. I do not think it is right to say that the manufacturer of the gun tests his own gun; because really the Officers working at Shoeburyness in all the experiments there, have nothing whatever to do with making the guns, and sometimes the guns come from private manufacturers. They are, I have no doubt, as perfectly willing to criticise any gun that comes to them and to find fault with it, as any naval man would be; and I feel quite certain—that as far as such a trial can be made in a place like Shoeburyness—it is a fair trial. At the same time I quite allow that a more satisfactory trial would be one more nearly assimilated to the actual conditions of war.

Major MONCRIEFF, F.R.S.: The great importance is evident in the present transitional state of naval architecture of such lectures as the one we have listened to, and they give rise to discussions on methods of treatment likely to be of advantage to the Service. I have some delicacy at present in making remarks with regard to that part of the question on which, of course, I am expected to speak. In dealing with this subject, on this occasion, the broadside, the turret, and other methods, have been brought before the meeting, but I did not observe that Captain Scott referred at all to one method which is calculated to give all the advantages of the "turret-system" without its defects. That method, namely, "the disappearing system," also bears upon another part of the subject of the lecture, namely, the exposure of the men and of the armaments to the enemies' fire. It stands to reason that the application of the disappearing principle, properly carried out, enables the men to work the guns under cover of iron armour, which is considerably below the port through which the fire is delivered; it thus does away with the necessity of that weighty belt of armour required to protect the men in the other systems of mounting the artillery on board ship. While making these remarks I am not the least surprised, nor do I complain that my subject should have been omitted from this lecture. It unfortunately rested upon two stools, one at the Admiralty, and one at the War Office, and it has fallen down between them; it is not, therefore, in so prominent a position as it might have been, had I been more fortunate. I hope before long, however, that it will take its proper place, and receive the same justice as other alternative systems, so that any advantages it possesses, may be utilised for the benefit of the Service.

Mr. DONALD CURRIE: I will only say a few words, not from any technical knowledge I possess as to the firing of guns, but as to the management of ships. It appears to me that the question in the next war will be one of steam-ship management. The quality of coal you have in your men-of-war will help you to gain a battle. If you start with a thousand tons of one class of coal in your ship, and another vessel has the same quantity of inferior quality of coal, the one ship will beat the other if the captain knows how to handle her. You have not, as far as I can judge, sufficient graving-dock accommodation at your naval stations round the world for the risks of maritime warfare. How would a steam-ship after a collision, or after damage in action, keep afloat and get repaired if off the Cape of Good Hope? Again, with reference to the Mercantile Marine (it may not be proper to go into that question), the Government are now elaborating a scheme for the employment of private shipping during war, but it will be found that there are many available and suitable vessels for use in event of hostilities, some of light draught for river work, others fit for ramming, others for torpedo-carrying in shallow water, others which can steam 12,000 miles, carrying coal the whole way, at from 12 to 14 knots' speed. The Government are preparing these plans, and they will develop their proposals at the proper time, but it is no question that there are hundreds of ships which at a given moment in the Mercantile Marine will be drawn into the Service very readily. With regard to manning our ships, it would be well to press Her Majesty's Government to carry out a system of training sailors, not only educating them well and subsidizing vessels to carry them, or helping the Mercantile Marine so as to get the use of them at the proper time, but by pushing on the Naval Reserve and encouraging it. You might have at a given moment a man-of-war of great efficiency. One of our ships went to sea the other day with eleven-twelfths of the crew belonging to the Naval Reserve, and the Captain was one of your own instructed Officers. No men can handle steamers in war so well as those who are every day at sea, but Naval Officers are compelled to stay at home perhaps for half-a-dozen years, and then

are ordered to go to sea in an emergency. I have always urged the advantage of interchangeableness between the services. It was only to-day I had an application from a Captain of a man-of-war to ask me to give him any sort of employment as an Officer. It is deplorable that Naval Officers should be driven to seek what they cannot obtain, and that is, employment in the Mercantile Marine, all because there is a want of harmony between the two. There is an absence of early training and association, which could be well carried out, if the Government would consider what the wants of the Mercantile Marine are, and reconcile them with the requirements of the Naval Service. Then there is the question of telegraphs. Before the Suez Canal shares were bought, I told the Government that in the next war, which would be in all probability in the East, there would be the great difficulty that the Suez Canal could be shut up in a very few hours by any Officer of enterprise and skill at the very moment the English fleet might be seeking to pass through, with stores or preparations for some naval or military operation. I pointed out that there were three lines of telegraph to India and China, and that it was proposed to establish a line of telegraph to the South African colonies by way of these established lines round to Zanzibar, and thence by Natal. I showed the Government that at that moment there was only one line of these three open, and that through Russian territory—the Indo-European line. I suggested that the wisest way would be to have an alternative line by the western side of Africa, and that it should connect our naval stations on the South Atlantic. No time should be lost, for in time of peace it is well to be prepared for war. We would be able to telegraph to the Gold Coast, with St. Helena, Ascension, the Cape, and Natal, and, indeed, I would add the Mauritius. The result would be that at any moment your men-of-war at the Gold Coast, or at the Cape station, or at St. Helena, or the Flying Squadron, could be called together suddenly; or by a connection with Brazil, the Pacific, and the West Indies, our squadrons there could be brought into play.

If anything should occur in the East at the present moment involving maritime action on our part, it is quite clear we have no arrangements for carrying troops round the Cape of Good Hope, no graving docks to put men-of-war into, no means of telegraphic communication. In the case of the Ashantee war, a cable was sent out, which did not arrive in time. But the Officer in charge took twenty miles of cable in his trunk when sailing with the troops, and had this laid down. No more was laid, but what had been laid was of service; for when the King of Ashantee sent his message to Sir Garnet Wolseley, our General was able to send it forward to the coast from the Adamsi Hills, part of the way by that wire, the other part by runners on foot. The whole telegraph if it had been laid would have been of service. Many such illustrations might be given to show how we have failed in our arrangements in moments of emergency, and that the great thing is to be prepared for anything.

Lieutenant GREENFELL, R.N.: It may be of interest to state that an effort is being made to revert to the use of cast iron for armour-plates. In the early days of armour-plating, cast iron, as we all know, was tried, but was found so defective that its use was abandoned for that of wrought iron.

The plates to which I refer, are cast in chill, and are consequently intensely hard on the surface, whilst the iron is so selected and combined that the plates have an extraordinary degree of general tenacity and strength, qualities which have hitherto been absent from the use of cast iron for these purposes.

When opposed to a gun superior to our 25-ton gun, hardly any impression was made on the plates at all, a result which seems remarkable.

I do not say that the problem is as yet altogether solved, but should the trials lead to success, the use of cast-iron for armour presents many advantages. It is much cheaper than wrought iron. The varying curves of the ship's side can be at once given. Its extreme hardness and local strength would be most efficacious in resisting the action of torpedoes, if armour is applied, as Captain Scott suggests, to the bottoms of ships, whilst it permits for turrets the use of the dome-shaped or cupola form, which, as every artilleryman knows, possesses so many merits from a defensive point of view.

It would also be possible to dispense with those sharp angles at the armour-shelf to which Captain Scott referred, which you see in the overhang of the "Tegethoff"

(diagram). In many other instances it seems to offer great advantages, and may possibly open up an entirely new field for the use of armour.

Admiral SELWYN: There are one or two observations I should like to make from the point of view of the men who fight the ships. Captain Scott considers that unsinkability is to be first desideratum; second, ramming powers; third, gun and torpedo powers; fourth, armour-protection; fifth, speed, with coal capacity or steam power. I want to suggest to him (with all due deference to his superior knowledge of the subject) that a vessel's speed is the one thing which every naval Officer wants. If his ship is fast, he will care very little what else she is, because he feels distinctly that that gives him the power to carry whatever offensive or defensive capacities he may have, most quickly to the scene of action. That fatal word "too late" renders nugatory the very best armour and the most perfect powers of every description; and we must remember that "too late" to-day, has even more importance than it had in former wars. Therefore, I say speed is the first condition. That a ram can be carried with nothing else on board, and be made to produce magnificent effects, no one one who recollects the arguments used by Admiral Sartorius, or the illustrations his arguments have since received, can doubt for a single instant: we have had too many fatal experiences of its power to doubt that it is so. Then it is clear that if you only have speed and the ram, you have a powerful offensive weapon. Therefore, I put speed first. I give the second value to unsinkability, because to carry about offensive weapons, or to retain the power of defending your country, you must at least be able to keep the ship above water. Next I put offensive power, and this may be varied. The ship may carry guns or torpedoes, so as to make her a formidable antagonist, for her ramming power may not be sufficient. The defensive power I put, as I think all English seamen will join me in putting it, at the very lowest of all our considerations. If you keep a ship above water and leave her some offensive power, seamen will not ask to be kept entirely from the effects of shot or shell. We do not expect it, for we know we cannot get it. I think the first requirement, speed, is to be obtained primarily by studying the results of such experiments as those carried on by Mr. Froude, and by carrying them at once into practice. As fast as Mr. Froude turns out an accepted fact, let us try it. Do not let us wait until he has carried out, some years hence, the most elaborate of his experiments, and then find that we have built at a very large cost, vessels to which his finished experiments point as being wretched blunders. Then the duration of speed. This must be a question of fuel, and, as I heard from Mr. Barnaby on the last occasion I saw him here, that he thought I had abandoned the question of condensed fuel, I beg to say that is so far from being the case that I am still exerting myself in every direction to obtain due consideration for what I still consider the most important question of the whole, for the Navy; that is the power of carrying a large supply of fuel to sea. I am perfectly convinced by all those experiments which I made that there is no difficulty whatever in obtaining three times the amount of power from one pound of condensed fuel that now can be got from the best coal, and that there is a probability that a careful consideration of the chemical effects derived from burning steam in the presence of carbon will show a possibility of raising that to six times. That has been done in a large boiler, and I think it can be done again. Therefore, fuel can be made more lasting by being condensed first, and scientifically used afterwards, and speed can be made lasting also. But it would be ridiculous to attempt to give us improved fuel, if at the same time, thorough and careful attention is not given to the form of boiler in which we use it. That is one of the greatest defects in our modern steam-ships. The boiler is simply an absurdity from beginning to end. We attempt to burn fuel in a chamber whose walls are surrounded with hot water, and as we can never keep up the proper temperature of combustion round that fuel, we always get smoke. The cellular construction, I quite agree, carried out to the utmost limit, and accompanied with wise stowage, will give us all we can hope to have in unsinkability. I think the resistance to under-water shot, which is part of the question of unsinkability, may be obtained by carrying more armour under water and less above. I think it may also be wisely considered whether that armour ought always to be carried outside the ship, whether it is not a wrong idea, and particularly if you get chilled cast iron to resist chilled shot, whether that could not be usefully employed in the structure of the ship, whether the armour ought not to be part and

parcel of the structure of the ship, whether you cannot carry that armour inside, so as to require less area than it does now outside. It could also be used in another way. All seamen know the value of bringing up ballast in giving great stability, great steadiness, and easiness at sea, and if ballast, instead of being put in to remove what Mr. Scott Russell calls wretched blunders, in one lump at the bottom of the ship—a practice of which Captain Scott has very ably shown the great disadvantage—if we disposed it properly we ought to get more value out of it than that of being simply ballast. As regards enlarging the chamber of the gun, I think the question is hanging back very much more than it need. I cannot see any particular reason why we should wait for an 81-ton gun in order to discover the effects of enlarged chambers, or why we cannot do that quite as well with any other sized gun, and why we cannot experiment with powder, which I regard as one of the important questions, still more than we do. We have got to a state in which there are different kinds of powder for every particular gun; from the Martini-Henry up to the 81-ton gun, we have powder of a different nature for each kind of gun. I advocate very strongly indeed a much larger expenditure in wisely conducted experiments. I do not think that these can be fairly and properly committed to any one class of men, or to any one committee. I think all the engineering talent available should be enlisted, in order to solve the various questions, each by those persons most fitted by nature or scientific attainments to consider them. With reference to naval architects and the questions they are asked to solve, I think that would be best done by asking them very frequently to go to sea in their own ships, and if that were done, I think we should no longer hear that there were certain ships built in the Navy which were not intended to succeed. For instance, of the "Waterwitch," the "Vixen," and some others, it is said that they were not intended to succeed. This is an admission which I should have thought would be regarded by any persons who called themselves scientific as fatal entirely to the claim of any scientific knowledge whatever. In common with the other speakers, I have the highest appreciation of the lecture as one of the new developments of Captain Scott's labours. I am quite sure, had he been listened to when long ago he brought forward that remarkable improvement in rifling shot, to which he slightly adverted to-day, that is to say, ribbed, not studded shot, in which the centricity of the axis of the shot was secured by the driving power of the rifling, we should have had much less to lament in the effect of the powder-gases which are supposed to erode the bore; much less to lament in the weakness of our shell; and very much more efficient guns in the point which is the one most to be sought for, namely, the velocity with which the shot is propelled, and the force with which it strikes, since the latter results largely as a consequence of the velocity, instead of which the mass which has just been advocated as the only thing to be increased, gives us, besides other inconveniences, a striking force comparatively but little enhanced.

The CHAIRMAN: I think there is one point we must all agree upon, that is, in conveying our thanks to the lecturer for the very efficient way in which he has treated the subject throughout. We have enjoyed two lessons from Captain Scott, and if it had not been for the lateness of the season, we should like to have had a third. There is material in the lecture certainly for another discussion, and also for a great deal of reflection when we go to our homes. The more we consider it, the more we shall be convinced of its value.

Captain SCOTT: Captain Dawson is mistaken in supposing that I advocate the service 25-ton gun; but it is more powerful, and therefore superior to the 18-ton gun, which is the smallest that will penetrate armour.

There will always be a question as to the relative advantages of a greater or less number of guns, but having a sufficient number of plate-piercing guns, the great thing then is to get accuracy. I believe, as Captain Colomb, Commodore Good-enough, and other like careful observers have shown, that in ordinary firing, our seamen will only *hit* an enemy once out of ten times at a 1,000 yards: but I think, instead of that being the case, we ought only to *miss* once in ten times at a 1,000 yards. I believe that far greater accuracy than has yet been gained, is possible, and *ought* to be attained. Wimbledon has taught us what can be done with the small gun (the rifle), and I am quite sure if we were to take the matter in hand nationally, great results would be attained. I wish to point out with respect to the 38-ton

gun at Shoeburyness, which General Collinson has referred to, that its mean rate of firing, including stoppages, was actually four and a half minutes per round, and taking the average that Captain Colomb has given (see Vol. XV, page 412, *et seq.*), and supposing the 38-ton gun had been mounted on board the "Thunderer," this gun would only have given one hit per hour as the result of the rate of firing at Shoeburyness; so that the four guns, viz., two of 35 tons and two of 38 tons, which comprise her sole armament, would only have hit *once* in a quarter of an hour. I do not think that is a very satisfactory state of things. As to manœuvring and turning the ship quickly, I have mentioned the turbine, which affords an efficient means for reversing, and also for pumping the ship clear of water. The engine for weighing the anchor could be very easily applied; but I think most of us who have put forward plans, however successful they may have proved, are perfectly contented to let some one else work out the details for doing it. With respect to Major Moncrieff's system, as it has not been adopted into the Naval Service, I did not think it necessary to advert to it, in comparing the relative protection afforded to guns mounted upon the different plans now used on board ship. Speaking generally, four guns on board a ship is not a sufficient armament, for with the "Thunderer's" armament of four 35- and 38-ton guns you might only get one hit in every quarter of an hour. The 81-ton gun cannot be so accurate at sea as the 35-ton gun, and hence, judging according to our present knowledge, a ship firing four 81-ton guns will only hit another every half-hour. The graving-docks and telegraph lines that Mr. Donald Currie adverted to, no doubt ought to be provided for and proceeded with at once, for it is most important that we should have these *ready before* war breaks out. Supposing you took one of the vessels shown here, the "Alexandra," with an enormously heavy mass of armoured superstructure, into action, would she not require a graving-dock after the action? It is better to speak out plainly if a real need exists, because it will be met, and then we can be prepared for eventualities; but I fear that without docks to repair her battered sides, the "Alexandra" and other heavily weighted ships would follow to where the "Vanguard" now lies, viz., the bottom of the ocean. With respect to gun-boats, I will only say, as was vainly said prior to the breaking out of the Crimean war, that by utilizing such vessels as we may have at the moment, and mounting light guns in them, we might at once attain to a considerable amount of efficiency; but in the war referred to, we lost our opportunity, and built gun-boats which were too late to be of use. With respect to casting armour-plates and chilling them on the surface, I fear we shall not be able to use cast iron armour for this simple reason, that weight is a very important consideration, and you cannot get the same strength in cast iron that you can in steel. What we want is the best, and the strongest, and the toughest material, and I do not think that cast iron will give us this material. The only other point I need refer to, and really I am very sorry to refer to it, is the efficiency of our war crews as compared with that of other nations. If we take the fighting crew of such a vessel as the "Vanguard," with a complement of 461 men, we shall find that only about 200 are really drilled sailors, 100 are undrilled, and the remainder are either boys or non-combatants. Now, a French ironclad with 461 men will only have 23 non-combatants and no boys, so that she would have 438 men thoroughly well drilled. We should not allow that disparity to continue, but take steps to raise our war crews to a more thorough degree of efficiency.

I think I have answered all the points that have been put forward, except as to whether experimental firing with various guns has been carried out. The simple fact is that no such trials have been made, and the studded shot of the present time cannot safely stand the velocity which can be given by a battering charge. If the powder chamber were to be increased, the studs and wads used would break up the projectiles, and were these tried against armour-plates, I believe the defects of our present service system of ordnance would be apparent.

LECTURE.

Friday, June 23rd, 1876.

ADMIRAL SIR HENRY J. CODRINGTON, K.C.B., Chairman of the Council, in the Chair.

THE MERCANTILE MARINE CONSIDERED AS AN AUXILIARY TO THE ROYAL NAVY.

By T. BRASSEY, Esq., M.P.

MR. BRASSEY: I have been honoured with an invitation from the Council of this Institution to address the members on more than one occasion before to-day. Having previously written a long paper, with reference to the *personnel* of the merchant service, and its actual condition so far as it would be appreciated by an analysis of the Parliamentary literature on the subject, I feel that it is not necessary for me now to do more than give a short statement of the strength of the merchant service in regard to the ships. Of course the review of the situation in regard to the merchant steamers is exceedingly incomplete, unless those vessels are considered from a naval architect's point of view, and also from a naval Officer's point of view. Now I am not in a position to state to this meeting, as my friend Mr. Barnaby could, if he were not bound by official reticence, what the value of these vessels would be with regard to the power of carrying guns, and still less am I able to treat the subject from a naval Officer's point of view, and to indicate to the meeting the kind of armament which would be most suitable for vessels of the kind which we have to take into our review.

When I was asked by the Council to prepare a short paper on this subject it was suggested, and I was very thankful for the suggestion, that the preparation should be a joint labour to be undertaken by Captain Wilson and your humble servant. The difficulty was to know how the twin brothers were to work, and I suggested to Captain Wilson that he should undertake, if he were disposed to do so, a consideration of the best mode of providing the armament for these vessels, while I would undertake to examine the Parliamentary documents, and to ascertain the number of the vessels, and some of their qualities with reference to their speed. From various circumstances with which I am not acquainted, Captain Wilson has not yet set forth upon his part of the task, and I can only hope that he will be kind enough to follow up this short statement which I am now about to read with reference to the number of steamers that we possess, by considering, as only a naval Officer can, how it would be most expedient that they should be armed for the purposes of war. With these few words of explanation I proceed to read to you the paper which I have prepared.

It is proposed in the present paper to give a brief review of the resources we possess in our merchant navy for home defence, and for the protection of our commerce. Some may think that we are so secure, that preparation for the emergency of war is superfluous. We ought not, however, to be over-confident, for, as Lord Palmerston wisely said, "to imagine that we are safe from invasion now, without precautions, "because hitherto we have prevented it by precautions, is the greatest "of all possible absurdities."

The steam tonnage of the British Empire, according to the latest returns, is 1,825,000 tons; that of the United States, for over-sea foreign trade, 193,000 tons. France has 516 steamers, of 188,000 tons, and Norway has 199 steamers, of 39,000 tons. Our larger vessels are at least as well adapted for conversion into cruisers for the protection of commerce as the trading steamers of other nations are adapted for conversion into privateers. Our merchant navy list includes the following:—

Tons register.	Number of Steam-ships.
3,000 tons, and above.....	8
2,500 „ to 3,000 tons.....	24
2,000 „ „ 2,500 „	55
1,500 „ „ 2,000 „	165
1,200 „ „ 1,500 „	167
	Total 419

It may be presumed that all these ships could carry at least two armour-piercing guns, and in addition, a considerable armament of the 64-pounder gun, which, at the present time, seems to be the favourite weapon in the Navy for vessels not intended to engage ironclads.

I may perhaps here venture to interpose an observation upon the much-debated question of armament. Many naval men are of opinion that armour-piercing guns should be mounted in every vessel in the service. They think that there is safety in numbers; and that, however hopeless it may seem for a small unarmoured vessel to engage a heavy ironclad, circumstances may arise in which a flotilla of small vessels, armed with powerful guns, might inflict fatal injury even on an ironclad. It is to be remembered that the large vessel carries very few guns, and that our most powerful naval artillery has become so ponderous, and the range of view so limited, since the introduction of armour, that perfect accuracy of aim cannot be relied upon, especially should the fire be directed against a small gunboat moving rapidly on an irregular course. Hence a large vessel in narrow waters might suffer most seriously from a combined attack by a flotilla of gunboats of the “Coquette” class, or a squadron of cruisers of the “Opal” type. It would seem desirable, therefore, to introduce a mixed armament, at least in some of the vessels, which are now armed exclusively with the 64-pounder gun.

To return to the merchant navy, it would be a statesmanlike measure on the part of the Admiralty to enter into communication with the owners of ocean steamers, and to endeavour to agree upon terms for the hire of such vessels, in the event of war. As it has been thought expedient to engage a certain number of the merchant seamen to serve in the Navy, by giving them an annual retainer during peace; so it might be worth while to subsidize the owners of steamers, adapted to carry an armament, in consideration of their undertaking to hold their ships at the disposal of the Government in the event of war. No less than 640 steamers were hired by the Government of the

United States during the civil war, and without these vessels it would have been absolutely impossible to have blockaded the coast of the Southern Confederacy.

What occurs to me as important in carrying out this suggestion is this, that it being admitted that by far the greater number of merchant steamers being, when built solely for mercantile purposes, very imperfectly adapted to any service of war, it would probably be an expedient course for the Government to endeavour to enter into communication with shipowners at a time when they were contemplating building new vessels, so that there might be introduced in the original design those necessary modifications which would enable the ships to carry guns. No doubt shipowners would say, "These things do not advance our interests in the least; we look simply to carrying passengers and cargo, and we are not prepared to alter our designs." To that, of course, the ready answer is, it is a mere question of expense, and if the Government be prepared to pay the expense for these modifications, and if the vessel be not injured by them for commercial purposes, I take it there would be no objection on the part of many merchants to do it, especially if the Government were prepared to pay a sufficient sum by way of retainer, enabling them to make use of these vessels for a stipulated amount in case of war. Of course such a suggestion means expense, but it may be better that the public money should be spent in that way; for I take it for a given sum of money you would have a very much larger number of vessels at your disposal, than if you built vessels expressly and solely for the purpose of war; and whereas an unarmoured vessel may be utilised as a merchant vessel in time of peace, it is quite certain that no ironclad can be utilised for that purpose. The question therefore is, whether it is not desirable to spend as large a sum available for ship-building as possible upon vessels which are exclusively of the fighting class, and to endeavour to supplement the fighting class by subsidiary vessels to be partly engaged in time of peace in the merchant service. Of course these things present themselves to everybody in the House of Commons from a financial point of view; perhaps they do not strike naval Officers in the same way; but what we have to consider is that the sum available for ship-building is not an unlimited quantity. There is only so much money available. You may have to increase the estimates; we have increased the estimates; we are increasing the estimates; and I dare say we shall increase them still more; but even assuming that we are to proceed in the direction of further expenditure, still after all the sum of money is limited, and no one knows it and feels it more keenly than those who, like Mr. Barnaby, have to rack their brains year after year in order to produce the greatest amount of force for the money placed at their disposal. Therefore it is worthy of consideration, whether you cannot provide your unarmoured fleet in part by some alliance and partnership with the merchant service.

All naval Officers are agreed in attaching more or less importance to the quality of speed in unarmoured vessels. The "Inconstant" was built specially with the view to attain an unprecedented speed. Now in point of speed, and in coal-carrying capacity, the fine steamers employed in the North Atlantic trade, present very remarkable elements of power. In his exhaustive work, Mr. Lindsay has published details, giving the average passages of the principal lines of ocean steamers between Liverpool and New York. The speed and regularity maintained are truly marvellous. I give a few figures, extracted from Mr. Lindsay's tables, which will serve to show what an immense reserve of power we possess in our merchant navy for the emergency of war.

The distance from Queenstown to Sandy Hook is 2,777 miles, and it was performed in the years 1873 and 1874, outwards and home-wards, by the steamers of the White Star, Cunard, and Inman lines, at the average speed shown in the following table:—

Line.	Outwards.										omewards.					
	1873.					1874.					1874.					
	Sail-ings.	Average time.			Sail-ings.	Average time.			Sail-ings.	Average time.			Sail-ings.	Average time.		
		Days.	Hours.	Mins.		Days.	Hours.	Mins.		Days.	Hours.	Mins.				
White Star	47	9	19	48	50	9	22	53	47	8	22	39	50	8	20	42
Cunard	52	10	16	51	52	10	16	54	53	9	7	59	52	9	5	48
Inman	50	10	22	4	51	10	22	1	52	10	0	3	51	9	10	50

In each year there were a few voyages of exceptional duration :—

Time.	Outwards.						Homewards.					
	White Star.		Cunard.		Inman.		White Star.		Cunard.		Inman.	
	1873.	1874.	1873.	1874.	1873.	1874.	1873.	1874.	1873.	1874.	1873.	1874.
Over 12 days	2	2	4	6	4	7	0	0	0	0	2	0
" 13 "	0	0	2	0	1	3	0	0	0	0	0	0
" 14 "	0	2	2	1	6	4	0	0	0	0	1	0

As an example of the marvellous perfection to which ocean steaming has been brought by the enterprise of British shipowners, unaided by subsidies from the Government, the recent performances may be cited of the "City of Berlin":—

Log of the Inman steamer "City of Berlin."

Queenstown to Sandy Hook.			Sandy Hook to Queenstown.		
Days.	Hours.	Minutes.	Days.	Hours.	Minutes.
7	18	2	7	15	28
Date.	Distance run.		Date.	Distance run.	
1875.			1875.		
Sept. 18	303 miles.		Oct. 3.....	388 miles.	
" 19	367 "		" 4.....	362 "	
" 20	376 "		" 5.....	366 "	
" 21	368 "		" 6	361 "	
" 22	380 "		" 7.....	381 "	
" 23	324 "		" 8.....	347 ¹ "	
" 24	381 "		" 9.....	362 "	
" 25	380 "		" 10.....	258 "	

¹ Fresh gale and heavy beam sea.

The performances of the White Star line have been equally remarkable for the extraordinary speed attained. In 1873 the *Adriatic*, sailing west, made the voyage from Queenstown to Sandy Hook at the average speed of 18.55 statute miles per hour; and in March, 1872, the same ship made the passage, sailing east, at the rate of 18.9 miles per hour. The regularity of this vessel's passage is not less remarkable than the speed, the average time for twenty-nine voyages from New York to Queenstown being 8 days 10 hours 57 minutes.

The shortest passage was in October, 1874, occupying only 7 days 23 hours 12 minutes. This passage was surpassed, by a few minutes only, by the "*Germanic*," which made the run from Queenstown to Sandy Hook, in August, 1873, in 7 days 23 hours 7 minutes. The greatest run in a single day, recorded by Mr. Lindsay, was made by the "*Adriatic*," on the 10th April, 1873, on which day she steamed 396 miles, the course being S. 61° W., with the wind N., force 6.

These particulars will have sufficiently shown what the large steamers of our Merchant Service can do. We are equally strong in the means of coast defence. The flotilla of steamers in our home-trade includes 5,530 vessels under 50 tons, 4,173 over 50 and under 100 tons, and 1,670 steamers over 100 and under 200 tons. If these 11,373 steamers were all equipped with Harvey's towing torpedo, and if, in addition, all those of sufficient strength were armed with one or two guns, no hostile fleet could approach our shores with impunity.

The torpedo has given a ready means of converting the smallest steamer into a formidable vessel of war. Torpedoes should be kept in store in all our great commercial ports. The captains of tugs and other suitable vessels should be formed into a Marine Torpedo Corps.

They should be thoroughly drilled in the use of the weapon by experienced officers, and their services should be secured by a retainer or pension.

A report was made to the Admiralty some years ago as to the adaptability of the tug and ferry-boats of the port of Liverpool for conversion into gunboats. A large number were found to be capable of carrying the heaviest gun at that time mounted on board ship. The 81-ton gun has since been constructed. A weapon so formidable can only be carried in a vessel of special construction and of large tonnage. The torpedo, however, has to a considerable extent neutralized the increased power of the gun, and has furnished us with the means of arming with a powerful weapon, every swift and handy steamer for coast defence. By the use of the torpedo and submarine mine, the narrow, shoal, and tortuous channels of approach to London, Liverpool, Hull, Glasgow, Cork, Bristol, and Cardiff—in short, all the busiest sea-ports—may be closed to the most formidable ironclads.

Though the subject is more interesting to a naval Officer than to a naval architect, I cannot omit from the catalogue of ships required for the Navy, a certain number of sailing vessels, to be attached to the receiving ships at Devonport, Portsmouth, and Sheerness, for the purpose of taking the seamen to cruise in the Channel in summer, and to Lisbon and Gibraltar in winter. Such vessels become more and more necessary for training purposes at a time when it seems probable that the fighting navy will be largely composed of mastless ironclads.

Having elsewhere shown the great superiority of our armoured fleet, I may here, in conclusion, advert to the relative condition of the Navy in unarmoured vessels. The Americans have only 39 unarmoured cruisers, and very few of these have a speed of 10 knots, a considerable number being unable to steam more than 7 knots an hour.

Probably gallant gentlemen in this room have had in their hands Admiral Porter's Annual Reports upon the condition of the United States Navy, and those who have read those publications must be aware of his great disappointment at the want of speed which characterises the unarmoured vessels which are placed at his disposal by a legislature which is even more narrow-minded than the British.

The Russians have but few unarmoured cruisers, and their entire fleet in the Baltic and Black Seas only carries 271 guns. The Germans have only 11 corvettes and 4 despatch boats, carrying altogether 145 guns. The Turks are practically without a cruising squadron.

I say that with deference to those who know more about these things than I do; but to the best of my belief the Turks do not possess any unarmoured cruisers of a kind which we should view with satisfaction if they belonged to our own service. Gallant gentlemen must appreciate the very different view we take of ships when they fight under the British flag and when they fight under a foreign flag. We are certainly more critical with our own ships than with foreign ships. That perhaps is quite right.

When, therefore, we compare our own position with that of other Powers, and when we find that the ships included in the return of vessels building in 1875, will carry no less than 304 guns, of a calibre on the whole incomparably heavier than that of the artillery mounted in the unarmoured ships of other Powers, it must be clear that our situation,

both in the present and in prospective, can give no just grounds for anxiety to the most susceptible and timid mind. The superiority of our resources will not, however, give us any proportionate advantage without complete and careful organization.

I most sincerely hope that the attention which this Institution is pleased to direct to these subjects may have the effect of promoting arrangements of the kind which I venture to indicate between the Admiralty and the merchant service. I believe that in our merchant steam navy we now possess what might, with a certain amount of trouble and expense, be converted into a valuable auxiliary; but if we were to take this question in hand in a masterly, effective, and liberal spirit, I believe that what we possess now is as nothing to what we might have hereafter. I trust the subject will be taken up perhaps by Captain Scott, or some other gallant gentleman, and worked out in a lecture to be delivered in this Institution at no very distant date. The *personnel* of the merchant service I have already ventured to discuss in a lecture delivered here in February, and the organization of that *personnel* as a reserve has also been treated, no doubt very imperfectly, by me, and much more satisfactorily by others in former lectures delivered in this Institution, and I believe that our labours have borne fruit. Anyhow, the Naval Reserve has been immensely strengthened in the last few years. I wish we could go further in that direction. I wish that every able-bodied seaman in the merchant service could be induced to register his name on the Reserve lists of the Navy. If that were done, if we had our seafaring population as much at the command of the country in an emergency as the seafaring population of France is, of course we should be, in even a greater sense than we are now, the dominant maritime power of the world. In order to accomplish that, you must have either compulsion or expenditure. We cannot have compulsion, and I think we have now sufficient expenditure. I think we give enough to the Naval Reserve individually. Therefore, the great question is to consider whether there are prejudices still lying more or less dormant in the minds of the seafaring people which tend to keep them out of the Navy. I was talking upon this subject only a few days ago with Captain Funnell, the Superintendent of Green's Sailors' Home, now very large shipping offices, and he told me that there still is an amount of stupid prejudice which keeps a great number of sailors from joining the Naval Reserve. He says that their wives object to it. The wives, I am happy to say, have great influence in that, as they ought to have in every class of society, and they think that this Naval Reserve means fighting, and interruption to domestic happiness, and their influence is strongly exerted in a sense adverse to the Naval Reserve. Well, I hope that may be overcome. The fighting will only be for their hearths and homes; and if their husbands did not go forth on the supreme emergency it would be very awkward for the wives, and I hope that may be appreciated. I have nothing more to say, and I thank you very much for your patient hearing.

The CHAIRMAN: The subject is a most interesting one to us, and I hope there are gentlemen present who will kindly favour us with their opinions not only on the constructive part but also on the part relating to the *personnel* of the mercantile marine.

Commander W. DAWSON, R.N.: It is a very important question whether in a national emergency this country cannot have the benefit of the services of some 4,000 or 5,000 splendid steam-ships, and whether no means can be devised for converting these steam-ships into valuable auxiliary engines of war for the defence of the country. You, Mr. Chairman, may remember better than I do, how about a quarter of a century ago a Committee of Naval Officers was appointed to consider the armament of merchant steam-ships. In those days we had not the mechanical means of mounting guns which Captain Scott has now provided us with, and it was decided that it would require a good deal of strengthening to the decks and beams of these ships in order to make them fit to mount and work even the 32-pounders of that day; but I take it there would be no difficulty in the present state of mechanical science in mounting, say 64-pounders, in most of the sea-going steam-ships of the Merchant Navy. It is true that it is a question of expense, but we are speaking of an occasion of a maritime struggle for national existence, and then expense must be

thrown to the winds. It would not then be a question of 10,000,000*l.* or 11,000,000*l.* for the Naval Estimates, but of saving the country. It is, therefore, a question that ought to be taken into serious consideration now, in the piping time of peace, in order that it may not only be done economically, but efficiently, and rapidly, when the time of trial comes. It would be well if the Government could experiment a little on merchant vessels of different classes, in order to give naval architects and naval artillerists an opportunity of discovering what is the best and cheapest way of strengthening these ships, and what armaments they could most conveniently carry. For my own part, I see no difficulty in the way of strengthening any seagoing merchant ships by internal girders and cradle work, so that she shall carry any sized gun. But no very extreme weight of ordnance is required. What is required is this, that merchant vessels may be made capable of carrying an ordinary gun; that their bows may be fortified for ramming, and that provision may be made for the use of various kinds of offensive torpedoes, so that when called upon, they may be able to fight vessels of somewhat the same class. So far I quite agree with those who are of opinion that auxiliary unarmoured vessels converted from the merchant navy need not carry guns capable of piercing thickly armoured ships. But there is a class of unarmoured vessels beyond these, auxiliary merchant ships—unarmoured men-of-war for attacking forts and for other purposes, and the armament of those vessels is a disputed point. I am one in favour of the mixed armament which Mr. Brassey has put forward, but he has not quite brought forward my argument, which is this:—An English ship-of-war cannot always be the strongest in fight; she cannot always be the fastest on the seas, and she may be driven into such a corner that she cannot run away, and must either strike her flag or fight a far superior force. Her guns ought to be capable of perforating that superior force, whatever thickness the sides of the enemy's ships may be. If her guns are not capable of perforating the enemy, she is perfectly helpless, and I do not think it is fair to send men in command of unarmoured vessels, armed with weak hitting guns, out to China or the Pacific, where they may be compelled to encounter iron-clads. Let the guns be so powerful that the English ships-of-war, of whatever size, can pierce the hostile side, and then English Captains need not be frightened because they cannot run away from a Japanese, a Peruvian, or a Turkish ironclad. This is why I am strongly in favour of mixed armaments for the smaller class of ships-of-war. With reference to the auxiliary force of cruising ships, there is no reason why the country should not be able to avail itself of the services of the steam-ships of the Mercantile Marine in case of war if they be provided with guns, torpedoes, and fortified bows; and as to expense, that must be thrown to the winds in a national emergency. As to the question of *personnel*, there were two points raised on the last occasion in the course of the discussion which rather taxed my credulity. One was, that the number of able seamen in our merchant navy who are not foreigners was so small that it would be about an average of one English able seaman per registered ship in the British Mercantile Marine. ("A.B.'s—first-class men?" Yes, I mean A.B.'s. My credulity cannot take that in; but I was relieved a little by another very eminent authority, who told us he had gone into the figures some little time ago, and had found that 12,000 fighting men were quite sufficient for the purpose of manning all the merchant steamers that we had under the British flag for fighting purposes. Well, if we take 4,000 in round numbers as the number of available merchant steamers that might be converted for fighting purposes, that would be three able seamen to a ship. Well, it would depend on how many fighting men were in the enemy's ship, whether those three able seamen would suffice to fight the enemy, unless they acted as Captain Bobadil, and asked the enemy to stand forward three men at a time. But I do protest against the assumption that 12,000 fighting men would go any reasonable way in manning the fighting ships which we could draw from the Mercantile Marine, to say nothing of the ships which we should capture from the enemy. I protest quite as strongly against that assumption as against the idea that there is only one able-bodied seaman to each registered English ship.

The CHAIRMAN: The subject at present is not quite so much the *personnel* as the *matériel* of the mercantile navy.

Commander W. DAWSON, R.N.: I understood you to invite discussion on the

personnel. I just wished to allude to those two points in our former discussion, and to say how cordially I agree with what Mr. Brassey put forward in a pamphlet which he published last year, on unarmoured vessels, and to thank him for the labour he has so frequently bestowed in representing the Navy, as he has so nobly done both in the House of Commons and elsewhere.

Rear-Admiral DE HORSEY: I think we are very much indebted to Mr. Brassey now, as we always are when he gives us his valuable information on naval matters, and I feel particularly the importance of the subject he has mentioned to day, the arming of the Merchant Navy; but I should like to suggest its being done in a different way. Preparing passenger and other merchant ships for carrying guns now in time of peace would lead to very large expenditure, and I think the shipowners would not be satisfied even if they were well paid, for they would say it interfered with their speed and the accommodation for passengers and cargo. I cannot see why the Government should not bring in a bill to empower them in the event of war to take such vessels as they required, at a valuation, as they now take land for public works and for public convenience, as in the case of railways. How much greater would the cause be when it was for the safety of the nation in time of war! I think that no reasonable shipowner could complain if a fair sum was given him for his ship when she was wanted. With regard to strengthening an ocean steamer to carry guns (I speak with diffidence in the presence of Mr. Barnaby and other naval architects), but I can conceive no difficulty whatever. Their hulls are as well able to carry 100 tons in the shape of a gun as in the shape of cargo. The part that requires strengthening is the deck, and our naval architects are quite able to put any amount of strengthening. I feel confident that they would make no difficulty about that in time of danger. The Chairman said that we were not to talk about the *personnel*, but perhaps I may be allowed to say one word. I think to improve the *personnel* of the Naval Reserve it would be desirable in the first place to improve the Merchant Navy. The men require improving before they are fit for us to take into the Naval Reserve.

Captain BEDFORD PRINCE, R.N., M.P.: I see a very eminent naval architect present, Mr. Scott Russell, and I should like to ask him to give us the benefit of his opinion upon this point. Mr. Brassey tells us that we have in our Merchant Navy 419 ships of a large size, and that "it may be presumed that all these ships could carry at least two armour-piercing guns, and in addition a considerable armament of the 64-pounder gun, which at the present time seems to be the favourite weapon in the Navy for vessels not intended to engage ironclads." The question I wish to ask Mr. Scott Russell is simply this: all those ships have at least eight times their beam for length; many of them have ten times their beam for length. Will Mr. Scott Russell tell us whether any one of those ships can carry the armament proposed by Mr. Brassey upon her upper deck without capsizing, and especially after she has got well out of her coals, after, say, five days' run? For my part I believe that the mere firing the gun, would start every rivet in its neighbourhood. It seems to me that the long, narrow, unhandy steamers we have at the present time are utterly incapable of being used in time of war with heavy guns on the upper deck.

Captain SCOTT: What do you call a heavy gun?

Captain PRINCE: A 25-ton gun—the gun named by Mr. Brassey.

Admiral SELWYN: I join most heartily with those speakers who have said that Mr. Brassey's paper is one of the most thoughtful and valuable that we have had in this Institution on the subject. In almost all the conclusions which he draws, I should thoroughly agree. I am particularly able to confirm all that he has said with regard to the value of the great ocean lines running across the Atlantic, since I have been very often across lately, and have seen vessels doing even better work than those of which he has given you the returns. He has got only eight above 3,000 tons. I think that will be subject to the new measurement, which will make a little change in favour of a larger tonnage. Mr. Scott Russell has been for many years practising all sorts of plans to make a difference between the measurement tonnage and the actual carrying capacity, with great success to his firm, but when we are considering such questions as this, that should be eliminated. Their fuel-power is extraordinarily great, and so is their speed, and these are two points on

which we ought to be able to imitate them more nearly in the Navy. They will be of the utmost value in case of war, when we shall be called upon probably to provide for the rapid carrying of troops to our colonial possessions. With regard to their carrying guns, I entirely agree with Admiral de Horsey and others that there would be no real difficulty if you give them the right carriages. The question of weights could be easily disposed of. The weight on deck is nothing in a ship of that size. Captain Pim has forgotten that length gives stability as well as beam. As to the question of subsidy in peace, I think it would be rather a wasteful expenditure, because our most durable steam-lines do not always remain in the same hands, and in some cases the change is very frequent, and we cannot give an owner a subsidy when the ship would pass out of his hands. I would rather give the full value for the ship, as was done in the case of the "Himalaya" in the time of the Crimean war, with good effect. With regard to the torpedo, I quite agree with Mr. Brassey that it is a most admirable weapon, and that even where no guns can be carried, it would be most formidable in the hands of a fast cruiser. Those who dared to follow her, would very often find a torpedo in their path. The question on which I venture slightly to differ from Mr. Brassey is this: the Navy of England has, as its chief purpose, the protection of the commerce. Commerce must be carried on, if we would have the sinews of war equally during war and peace; and we cannot afford to take away the very best ships from that commerce at the moment when we are most pressed for our food and for other things which are essential to the well-being of the nation; and we must recollect that every vessel taken under those circumstances from the Mercantile Marine takes a certain portion from the sinews of war. If we are driven into a corner and overweighted, then it is quite clear that, as with the Volunteers so with the Mercantile Marine, every nerve must be strained to defend the Empire. For that purpose organization and registration ought to take place now. Every inquiry ought to be made during peace, that we may be prepared to take them when the necessity arises. We ought to think that it is wiser to spend treble on the Navy for really efficient vessels during peace than to take from those which would provide the sinews of war when the necessity arises. As regards the *personnel*, I will only say one word, and that is, I think the money may be expended much more wisely than it is now, and with much better effect, if we only give when the men come back to us, instead of giving constantly.

MR. BARNABY: I came here to listen to what might be said by Mr. Brassey, and by the gentlemen assembled here, and not for the purpose of saying anything myself. I feel as Mr. Scott Russell does, that I would like to hear all the Naval Officers speak, and I think I may ask to be excused from saying more than one or two words. It is right perhaps that I should say this much, that the difficulty which is felt with regard to the use of merchant ships for fighting purposes is not with reference to the strength of their structure, nor their stability, but with reference to their division into compartments. It will be remembered by everybody here, that as iron came to be used very largely in the Merchant Navy, it was believed that the time was come for giving up that mode of strengthening the Navy in time of war, and the Report of the Committee in 1852 was to the effect that those vessels being unfit for war purposes, the subsidies which had been granted ought to be put an end to. Fresh light and the introduction of better material and better modes of construction, and other weapons than guns, have brought us round to the conviction that iron ships built for mercantile purposes may be armed and used certainly for their own defence in time of war, and possibly also as auxiliary to the Royal Navy: but I would point out again that the one difficulty that has to be overcome is, that the merchant ships which are being built, and some of the grandest among them as to speed, coal-carrying power, and sea-going qualities, are deficient in what we consider ought to be a necessary provision for security against foundering in the event of any one of their compartments being damaged. What the arrangement with the owners should be is a question which is undergoing the consideration of the Admiralty, and you will excuse my saying anything further upon it.

MR. SCOTT RUSSELL, F.R.S.: Sir, if no more sailors will do us poor shipbuilders the honour of confiding to us their views on this subject, I will give you mine. I will use Mr. Brassey's words: "The superiority of our resources will not give us any "proportionate advantage without complete and careful organization." And what

does organization mean? It means what Lord Palmerston said, arranging for war long beforehand, during peace. Now, if you ask me whether suddenly and abruptly, and all at once, on a demand from the Admiralty, we would undertake to select for them vessels which would be good, sound, safe vessels, capable of being armed even with the most ordinary guns, and engaging with anything like fair security in war, I say we could not take that responsibility; we won't take that responsibility. Therefore, I hope Mr. Brassey's paper will be received with the greatest possible weight attached to its last sentence, and that you will believe that the great mass of those ships which he has quoted, are not at all to be relied on for war purposes. Now, I wish I could say that we English are in a condition to defy everybody; that we are stronger than all the rest of the world put together. Gentlemen, I should be a traitor to you if I said so, because I should lead you to trust to a broken reed. Those vessels which Mr. Brassey has so eulogised, are vessels which with a very slight blow from a rock, or a rocket, or any of those ingenious weapons which we see exhibited in this place, would certainly go to the bottom. Therefore, I entreat you to place no faith in them. I do entreat you, on the other hand, to place faith in vessels which Mr. Barnaby and the Admiralty may be building, unarmoured, but with great precautions, trying to make them as safe as possible, and with power to carry certain guns. But as we are all friends and countrymen here, will you allow me to tell you of a terrible blunder you have made? I think about forty years ago I was asked to take the responsibility of building four Royal Mail steam-ships to carry mails for you at the greatest possible rate then known. I built you your ships; they were the fastest of the whole of that fleet; they were quite satisfactory; but what did you do at that time? You did this: you made me responsible to you that those ships should be capable of carrying guns, and before you would give the ships their subsidy for carrying the mails, you made them satisfy your Admiralty that they were seaworthy and able to protect their mails against invaders. Why have you dropped that? Can anybody tell me that you still do that? I asked the highest possible authority the other day what he could tell me about that, and he said he had never heard there was any such thing. You are now paying all the money you do for the mail service to magnificent fleets of ships without ever once asking whether those original arrangements have been adhered to, and whether the vessels are fit to be trusted in time of war. Now, I ask you Members of Parliament, what representatives are you of the public interest if you have allowed that sort of thing to go on? And now you come and read your papers! Why, if you had looked into the accounts of which you boast so much, if you had looked into the votes a little bit, you would have found that all that money that was paid to those companies on those conditions, has not been earned. Now, I think you will agree with me that there are funds at the disposal of the nation for this honest national purpose, and following up what Mr. Barnaby has said. I will do what I have always promised I would when you sailors put me a difficult question,—I will give you a straightforward, open answer. You tell me that you want merchant ships to be ready for your purposes in time of war. You have only to let that generally be known; you have only to tell all the ship-owners that you will give a preference to ships which have those qualities which you require; you have only to say that all your mail contracts shall include that condition which I have referred to; you have only to organize and arrange beforehand, and you will find one day that you can use all your Merchant Navy for war purposes, for it is not difficult to make them so. You have only to have a wise proportion of beam and depth; you have only to get a wise position for that beautiful element in our modern ships, which so many of you forget, the ballast! We have got ballast now without paying for it; we have got the most magnificent arrangement of ballast in our engines and boilers. If you put them in a foolish place, you make an unseaworthy ship; but if you put them in the right place, I become responsible to you that you can carry a large deck armament of those delightful 8-inch guns which we have been talking of. But if you do not do all this beforehand; if the Admiralty do not see that they are of the right proportions; and if the Post Office do not see that these things are carried out before they pay the quarterly dividends for carrying the mails, then they will never get them. Another thing you can perfectly well do to benefit the public, and the sea-faring population: you can make it a sin by Act of Parliament to send a large merchant steam-ship to

sea which was not practically unsinkable. You say that is nonsense ; I say it is not nonsense, because my "Great Eastern" steam-ship, by the skill of a clever captain, who found out a rock in quite an out-of-the way place, had a hole torn in the hull 83 feet long and 9 feet 10 inches wide in the centre, and with this hole in her bottom she went to the end of her journey. They tried to cobble it, and could not ; and with this hole she came back from her journey. She carried all her passengers and cargo safe and dry to one end of the journey, and brought an entirely new set of passengers and cargo safe and dry to the other end. That she did, too, without being surveyed by the Admiralty, and without being chartered as a mail-ship. Now, I ask you, am I wrong in saying that if you will put the problem to us ship-builders, we know how to accomplish it ? I think I know, and I think Mr. Barnaby does, how to make a respectable sea-going steam-ship, unsinkable by all the ordinary means ; and I think he knows how to put on board such a ship a very large armament of guns, which may not be capable of encountering and sinking a fully armoured ship, but which will be capable of sinking a great many cruisers and privateers, and doing harm to a great many troublesome customers. Will you allow me to say one word as to how I should set about it in our private ships. I should like to have my unsinkable ships ; I should like to have the ballast in the right place, which would be pretty low under the water ; I should like to have my guns in the right place, and of a big diameter. I do not want to have them very heavy, because I do not want to be far away from the enemy ; I want to come close to him. Give me big shell, big shot, and big bore ; then with my fleet of twenty merchant ships I would surround this grand fellow with his 81-ton guns. I would pepper him, and if he sent one of his 81-ton shots through me here and there, I should not mind ; if half-a-dozen of us sank it would not matter ; if we sank him we should win the victory. Therefore, I entreat you not to arm those sinkable, incapable ships which Mr. Brassey has spoken of, with any hope of doing good, but return to your old ways as quickly as possible, and say that any person who desires the Government money, must, in some way or other, put his ships into a condition to be fit to serve for purposes of defence in time of war against all vessels of his own class, whether they are called privateers or anything else.

MR. BRASSEY : I am sorry that I am obliged to leave this room, but I trust it will not cause the discussion to terminate if any gentleman is anxious to address you. I am sure I appreciate very much, as I always do, the kind reception I meet with in this theatre. With regard to the speech which we have just heard with so much interest and satisfaction, I am quite sure it was a very instructive and stimulating discourse for those Members of Parliament who are present. I see before me three of the least benighted and incapable of your neighbours at St. Stephens, and I am sure we shall go back to our labours refreshed and encouraged by Mr. Scott Russell's speech. Feeling as I do from what he said, that the idea of utilising the merchant steamers is feasible if properly carried out, I certainly, along with others, will watch carefully the next arrangements that are made with regard to the contracts for carrying mails, and will not allow the opportunity to pass by neglected of introducing afresh into those agreements the beneficial arrangements which were formerly made, because I am one among others who take an interest in these subjects without having the professional knowledge which distinguishes Mr. Scott Russell. Therefore, one would not be disposed to press a view upon the House of Commons such as he has propounded, without being satisfied in the first instance by professional advice that it was proper to be entertained by Parliament. But now, after having heard so many able gentlemen assure us, that with comparatively inexpensive modifications introduced at the right time and in the right way, you may make a large number of your merchant steamers valuable for war, I say that when we come to deal with mail contracts again, we must make use of that which is an excellent opportunity of doing what I was proposing, that is, making your arrangements *ad initio*, when the vessel is about to be built. It may be that the same principle may be extended even to vessels which are not to be used for the conveyance of Her Majesty's mails. I am very sorry that I have to leave the room, but I trust it will not cause the discussion to terminate, if gentlemen are pleased to continue it.

On the motion of the CHAIRMAN, a vote of thanks was passed to Mr. Brassey, before leaving the room, for his valuable and suggestive paper.

Mr. BUTLER-JOHNSTONE, M.P.: I too, in common with Mr. Scott Russell, was extremely anxious to hear all the naval men speak on this occasion, and I was equally anxious to hear the naval architects, because it is essentially a question for naval architects as well as for naval men. But there is also another aspect of the question which is no less important. In old times there were two descriptions of ships which we sent out in case of war. There were the ships which had to fight the enemy's vessels,—and do what you like with the "Cunard" and "White Star," and other lines, you will never make them equal in fighting strength to a vessel built expressly for that purpose, any more than you can make a carrier pigeon equal in strength to a hawk; but there was another class of vessels sent out, what we used to call specifically "cruisers," to prey upon the enemy's commerce, and to destroy his resources, and so put an end to the war. These fast-sailing clipper steamers are the very things which could, at a very small expense, be admirably adapted for that purpose. But if, as Mr. Scott Russell said, we made a mistake forty years ago relative to the contracts for mail steamers, what a gigantic, what a disastrous mistake we made twenty years ago, when we signed the Declaration of Paris; because even if you send out the cruisers, and cover the ocean with your fast-sailing ships, carrying guns, there will be no commerce to prey upon. Do you suppose any enemy will be foolish enough to come out of his forts and fight your vessels when he can remain in, as the Russians did, and defy you? Nelson's great victories, Howe's great victories, how were they achieved? By putting an absolute embargo upon the enemy's commerce. The enemy came out to protect his commerce, and then you sank his fleet. But now, under the Declaration of Paris, the enemy's commerce will sail under a neutral flag, and there will be nothing for your cruisers to prey upon. You may spare yourselves taking any trouble about these armed vessels, for there will be nothing for them to do. You have plenty of ships of war to defy the enemy, but they will never come out to you; and as long as the Declaration of Paris is unreppealed, there will be no enemy's commerce to prey upon; and all these questions of turning our merchant steamers into ships of war are useless. There will be nothing for them to fight. In my capacity as Member of Parliament, I thought it my duty to put this aspect of the question before you. I have received great profit from the discussion to-day, and shall be only too happy to support Mr. Brassey the next time a mail contract comes before Parliament.

Captain SCOTT: Mr. Scott Russell has given us a view of the future, but what we want is a correct knowledge of the present requirements. Of course you may find fault with the strength of merchant ships, but the point is to utilise them for what they are fit, and doubtless this very foundation force can be largely utilised. As Mr. Brassey has just left this theatre, I can freely refer to the great good he has done, in stirring up the authorities to inquire whether our merchant steamers can or cannot carry guns. This question, and also the question as to the best use which can be made of the merchant navy during war, ought long ago to have been settled. At the commencement of the Crimean war, just before the sailing of Admiral Napier for the Baltic, when I had just returned from a special mission with the masters and pilots intended for his fleet, I put before the First Lord the suggestion of Mr. J. Bodie and the other masters, viz., the effect it would have, if all the powerful steam-tugs were to be immediately taken up, armed, and sent off at once to Cronstadt to threaten St. Petersburg. Look at the moral force we should have exerted by their early presence. The First Lord, however, sent for me the following day, and said he had been considering the matter, and would build some vessels, as was accordingly done, but they were built too late to take part in the war.

Mr. GREAVES, M.M.: Mr. Chairman, with your permission I should like to make a few remarks on this subject. In the year 1841, when the Royal Mail Company first started, I had the honour of being one of its servants, and very well recollect that every one of the Royal Mail Company's vessels was bound by the terms of their charter of incorporation and contract, to be built of sufficient strength to be able to carry an armament in the event of war. Of late years that idea has been abandoned, and if you were now to go to any of these mail companies and make a proposition to them to build henceforward only such vessels as would be approved of by the Government for the purpose of warfare, I do not suppose that they would listen to you for a moment. Since that time we have become a remarkably practical

people. Merchants and shipowning companies have now another gospel than that which prevails among the Navy and Army, who are brought up to regard warfare as their natural field of industry. Outside of the Navy and Army, there is a new gospel—"to buy in the cheapest market and sell in the dearest." Now, if such a proposition was made to the directors of these companies, they will say: "What are we going to do with the eighty ships, more or less, we have on our books?" "What would our shareholders say to us? We were incorporated under a Royal charter for a specific purpose, and laid ourselves out to carry the mails at a contract rate of speed; moreover, all our vessels are built so that they may be ventilated in the largest possible degree, and every one of these ventilation holes is a great source of weakness when you would set about the difficult task of strengthening these vessels, so as to enable them to carry an armament." These companies could not put aside their old fleets, because that would simply mean insolvency. Besides that, there is another reason. All these vessels that are now employed by the Post Office in carrying the mails under subsidy, suffer a very great deal from competition with other companies, which are not incorporated in the same way, and which are not subsidized by the Post Office, and yet which do carry mails for nothing; and in the course of some ten years we may almost assume that there will be no longer in existence any such thing as subsidies for mail steamers. Already a very large number of the existing companies are in great fear as to what they shall do in consequence of having over-built themselves. Witness, for instance, the Pacific Company, which has more ships than it can profitably employ; moreover these large mail steamers, if they burn more than a certain proportion of their coals are brutes. If any man has stood in Panama, or at the New Zealand terminus of that line, and seen those magnificent mail steamers come in at the end of their voyage, he must have been horrified to see what bladders they were, lying on the top of the water, and it is a fact that in those vessels the greatest care had to be taken to see that they did not get a permanent list. In the last days of their voyage you would see these ships—then "flying light"—swaying from side to side. With regard to the steamers eight times their beam, unless they could be always maintained at one particular measure of immersion, they would not be safe to carry guns on their deck. Neither, if war broke out, would we find artisans sufficient to refit them for purposes of war; for we have not at the present moment men enough in our dock-yards. Every man who reads his half-a-dozen papers a day—as he ought to do—and keeps his eyes open, knows we are on the eve of a very terrible war, and I do not believe we could take twenty or thirty of these vessels, and suddenly and swiftly prepare them and send them out. They would have to go out, remember, to fight all comers, and they are utterly useless when the coal is out of them. They must find coal wherever they go. They will not be able to say, as now: "Good bye; this day ten days I shall be in New York." Those competing mail steamers burn coal without any economy at all. Engines of the most economical class are put into them, but they are all competing with each other, and if one makes a shorter passage than another by an hour, there is a paragraph in every Liverpool and every London paper the next day about it. They are living the life of men who compete with one another, knowing that the chances are that some one or other of these companies must cave in, because, for the most part, they have over-built themselves, and their carrying powers are larger, particularly at this present moment, than this country has any demand for. If you were to take the whole of the mail steamers employed by the Post Office, I doubt if you would find amongst them twenty vessels that could be made fit in a reasonable time, supposing war broke out, to carry a 64-pounder on their upper deck, and I have very much doubt whether the firing off of those guns, say, half-a-dozen times, would not reveal such defects in their construction as would make you very much surprised to think you could ever have had the audacity to place such a gun on board. Even if we had any number of these vessels, we have nobody to man them. One speaker has said he very much doubts the statistics with regard to the number of British seamen. I am perfectly certain that, do whatever you will with those statistics—you may be the greatest master of hanky-panky in statistics that ever existed in this world—but you cannot find four men to every ship that are fit to be called seamen. You may stretch a point, and assume that you have two able-bodied men to each ship, but the rest must be made

up of ordinary seamen, landsmen, and boys; and can you expect that joining the Naval Reserve for a month's drill in each year will make them of any value in time of war? Men turn round and say in their vernacular "*Cui bono?*" What benefit "do I get by it? Nothing at all. Not only that, but there is another reason why "I should not join the Naval Reserve. The Government has laid open the mercantile marine, which used to be the *British Merchant Service*, as a trading school for the seamen of all the nations in the world, and I find the foreigner in every grade and position. I have lost my bread, my industry, and my ambition; I am without hope; I do not care anything about it, and I intend to go out to the colonies, and remain there permanently, and become a citizen, and not follow the "sea any longer." We do not now find that class of men going into the merchant service during these last ten years that used to flock to it when I was a boy. You may find an advertisement in the "*Daily Telegraph*" from a firm for apprentices, who are to be allowed to wear midshipmen's uniform, which means that no two persons on board ship will be found to be dressed alike. A very large number of these youths who are thus invited and trapped are the sons of opulent tradesmen, and after a few years they find out that the life is a hard life, that it demands great self-denial, and a considerable degree of brains, and greater application than they thought, and they forsake it, so that we have not now in our merchant service any of those boys, of whom we once had such a number, growing up to men whose delight it was to fight. I take it as an absolute necessity if any man goes into the Navy, he must love fighting for fighting's sake, and I take it that a merchant seaman joins a fleet ship in the hope that she will be so fleet that if she meets an enemy she will be able to run away, and never fight at all. In fine, there is an utter absence at this moment, as there has been for years, of anything like sympathy between the men who serve on board the merchant ships which now sail under the British flag and those men by whom her Majesty's vessels of war are manned, and for the simple reason that in every point, their lives are as different as it is possible that lives can be.

Captain CARMICHAEL, 5th Royal Irish Lancers: The speaker who has just sat down said that this question of shipping is affected very much by the gospel of England that we must buy in the cheapest market and sell in the dearest. Now, we bring forward these questions at this Institution, not so much as soldiers and sailors, but as Englishmen, and it is because we believe that in the end the commercial classes will have to buy in the dearest and sell in the cheapest market if they neglect the Navy, that we open these discussions. With regard to the armament of these cruisers, perhaps I may be permitted to draw a simile from the Army. If we send out a cloud of cavalry, composed of three squadrons, and there is only one opposed to us, we prevent the enemy doing us a great deal of injury; but if the enemy bring up their heavy artillery and infantry, we have to retreat. So, if we have a numerous body of light cruisers, we shall defend ourselves from a great deal of damage that we should otherwise suffer; but when the heavy ships come up, no doubt we shall have to give way, and if we have no heavy vessel to meet those of the enemy, we shall suffer. But plainly we are better off with a great number of light cruisers than without them.

The CHAIRMAN: If nobody else wishes to address us on this subject, I think I may gather up your opinions in this, viz., to thank the lecturer, Mr. Brassey, not only for this lecture, but also for the previous one, and for the amount of attention he has uniformly given to these subjects, greatly to the benefit of the nation as well as of the Navy. I am sure you will all join with me in thanking him, and hoping that he will continue his attention to them as efficiently as he has done.

LECTURE.

Friday, June 9th, 1876.

GENERAL HORT, C.B., in the Chair.

THE STUDY OF MILITARY HISTORY BY THE REGIMENTAL OFFICERS OF THE ARMY.

By MAJOR LONSDALE A. HALE, R.E., Instructor in Military History,
&c., &c., R.E. Establishment, Chatham.

MAJOR HALE: General Hort and Gentlemen,—If any excuse is required for an Engineer Officer undertaking to deal with this subject, concerning as it does more particularly Officers of the non-ordnance and mounted services, I hope it will be found in the fact of my long and intimate educational connection with those services, a connection which I look back to with the greatest pleasure, and which I am glad to say is not altogether terminated. Among the conclusions to which that connection has led me, there are two or three on which I would base my observations this afternoon.

The first of these is, that there seems to be an impression on the part of regimental Officers that the study of Military History is not incumbent on them as a body; that it is incumbent only upon those of them who intend to lay themselves out for special employment, such as employment on the Staff. I hope to be able to show in the course of my observations this afternoon that that idea is altogether unfounded.

The next is that among those Officers who do make a study of Military History, there is a very large amount of labour misapplied. It is misapplied with regard to the character of the reading, especially as respects the period of Military History which is the subject of study. As an instance of this, I may mention the case of two Officers whom I met a short time since—two Officers of different ages, of different ranks, belonging to different branches of the service, and, I am perfectly sure, of different intellectual tendencies. Both told me that they wished to study Military History. I asked: "For what purpose—" whether as an intellectual study, a literary study, or with any other "object?" They said the purpose they had in view was to make themselves better soldiers in the field. I then asked them what they proposed to study, and they had both struck upon the same book, Napier's "History of the Peninsular War." As they told me that their object was to become practical soldiers, I, not unnaturally, said:

"Then of course you have read all about the campaign of 1870 and '1871?" No, they had not read much in connection with that war; that is to say, those two Officers, in order to become practical soldiers, were about to study the tactics of a period when men fought, so to speak, across a pocket-handkerchief, whereas now they fight across the main-sail of a man-of-war; of a period when, if a man fired at a church-steeple, he, according to an old saying, was lucky if his shot fell within the parish, whereas individual men can now-a-days be struck by small arms at about 1,000 paces, and artillery boast that troops are not safe from them at upwards of 4,000 yards. These Officers were merely typical of a number of others, who begin their studies altogether at the wrong end. They should begin with the events of the most recent campaign, inasmuch as the tactics therein pursued are more like, though not exactly like, the tactics of any future campaign in which they may be engaged.

I also find that the regimental Officers who do study the most modern Military History do not study the right documents. A class of writers has sprung into existence to whom we are doubtless very much indebted—essay writers. I am not talking of prize essayists, but of essay writers generally, and I find they are a very popular class of writers, and very much read by regimental Officers. I do not wish to say one word against these essay writers, but I do feel it to be my duty as an instructor in tactics, especially to protest against the *undue* importance which is attached to the writings of these gentlemen. They are, as a rule, men who have seen no service whatever in modern war. They are most industrious people; they collect a very great number of facts, and on those facts they build up their own theories. Now, of all facts which it is difficult to obtain, the most difficult are those which occur on a battlefield; and when we have obtained those facts we know there are numerous stand-points from which they may be viewed. I would, therefore, ask the regimental Officers not to put implicit faith in, or to ascribe too much authority to, these writers, but first of all to study the original documents connected with the last campaign, and having provided themselves with the means of ascertaining the accuracy of the facts that these essayists deal with, to use their own common sense, and to test the theories of the essay writers.

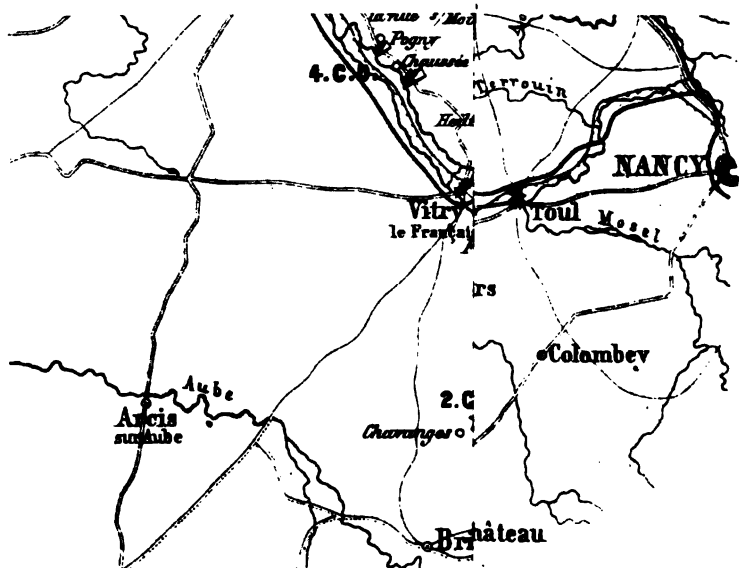
We are very fortunate in having at hand authentic documents connected with the campaign of 1870–71. First of all, we have them in the Official Account of the Franco-German War, 1870–71, which has been translated by Captain Clarke, R.A., of the Quartermaster-General's department. And with regard to that translation I wish to bear my humble testimony to the marvellous fidelity with which the original has been rendered into English. Then we have them in a book called "The German Artillery in the Battles near Metz," by Captain Hoffbauer, which has also been translated for us by Captain Hollist, of the Artillery. These two documents are drawn up by responsible persons and are founded on accounts furnished by responsible persons. The compiler of the official account has not had to depend for his information on the disposition of individuals to give it, but he has had before him reports of commanders of all companies

and all batteries engaged. They have been collated by the Staff at Berlin, and thus we have one of the most truthful accounts which it is possible to obtain of the events of a campaign. It bears the most searching analysis; and if ever it can be shown to be other than accurate, you may rest assured that the well in which tactical truth lies is unfathomable. But if you want to read this, you must be prepared for hard study. It really is hard reading. You won't find any sensationalisms in it; you will not find any "tall writing," as it is called; everything is described in the simplest and plainest manner. For instance, when in the Prussian account you find a regiment falls short of cartridges, you are told simply and plainly that the ammunition ran short; you are not told that the men raged angrily and furiously for their cartridges. When Von Steinmetz appears on the field of Columbeay and finds fault with the generals who brought on that fight against his orders, you do not hear anything of "the grand old boy's favourite oaths." There is nothing of that kind to be found there. The only "tall talk" I have been able to detect throughout the book, are the words "hero's death." There is no more high-flown language than that. When a man is killed, he is sometimes said to have died the death of a hero.

It is to this account that I would direct the attention of the regimental Officers of the Army. In such a wide field it is somewhat difficult to select instances to illustrate the value of its study, but I have taken as the first illustration, the conduct of the German cavalry on the 26th of August, 1870. With regard to anything that I have to submit to you, many cavalry Officers may say: "Oh, we knew all that before; we were told that our non-commissioned officers ought to be well instructed, and we quite believe it; we were told how much depends on looking after the shoeing of the horses, and keeping the horses in good condition; these are mere truisms." But I do not think that Cavalry Officers, unless they have studied this book, will find anywhere the practical application of these instructions so clearly laid down.

Sketch 1.—On the 23rd of August the Army of the Meuse and the Third Army, under the command of the Crown Prince of Saxony and the Crown Prince of Prussia respectively, set out from the line Jandelize-Gondrecourt. They were ordered to march in the direction of Châlons, where, during the 23rd, the French army were supposed to be. During the 23rd, 24th, and 25th of August there was no change whatever made in the direction of the line of march. The total strength of the two armies was upwards of 200,000 men, and their orders were that on the 26th the advanced guards should arrive at a much shorter line, St. Menehold on the north and Vitry on the south, and there be able to act against the French at Châlons. Up to the evening of the 25th no alteration whatever was made in the original direction of the line of march, and on the evening of the 25th we find the German corps in the position shown on the sketch (Plate XV). On the right were the 12th, or the Saxons; in front of them was their own cavalry division: in front of these were the 5th Cavalry Division. The Guards and the 4th, who were the remaining corps of the Second Army, were on the





left of the Saxons, covered by the Guard Corps Cavalry Division. Farther south were the troops of the Third Army, viz., 2nd Bavarians, the 5th and the 11th Corps, and on the extreme left the 6th Army Corps; the Wurtembergers and the 1st Bavarians were in rear of the 5th Army Corps. The 2nd Cavalry Division, the 4th Cavalry Division, and the Wurtemberg Cavalry Brigade covered the front. But during all this time information was gradually being collected at the King's head-quarters, which were first at Commercy and then at Bar-le-Duc, to the effect that the French were not at Châlons any longer; that they had moved off north-west, in the direction of Rheims. And not only that they had so moved off, but intelligence received also asserted that they were on their way, not towards Paris, but in an easterly direction, so as to effect a junction with Marshal Bazaine, who was at Metz. But Von Moltke was an old soldier, and he would not allow himself to alter the direction of the line of march without being perfectly sure of his grounds for doing so, and it was not till 11 A.M. on the 25th that any order whatever for the slightest change in the line of march was issued. When that change really took place, great inconvenience and great suffering were incurred by the German troops. That change of direction is sometimes thought an easy business, but if you look at Hugo Helvig's account of the march of the Bavarians you find they suffered very much by that change. The alteration made was very slight. Believing that the French might be at Rheims, but doubtful as to whether they had gone off to meet Bazaine, Von Moltke simply ordered that the line of march should take a north-westerly direction; that the 12th Army Corps, instead of going towards St. Menes, should incline slightly towards Vienne; that the Guards and the 4th Corps should move up in a similar direction, and that the corps down in the south should accelerate their pace; but at the same time he issued this order, which was a very important one, viz., that the cavalry should be *thrown well forward to reconnoitre the front and right flank and reach more especially Vouziers and Buzancy.*

Von Moltke knew that if the French had really started from Rheims in the direction of Metz, in all probability a large proportion of them would be found upon this main road running from Vouziers and Buzancy either to Dun or to Stenay. It was, therefore, of vital importance to him to know what was going on at Buzancy and Vouziers. After he had issued this order, fresh intelligence came in, and the Prussian Head-Quarter Staff were gradually brought to be nearly certain that the French were actually on their march to relieve Marshal Bazaine; but still nothing definite for the future movements was absolutely determined on.

On the evening of the 25th of August, Von Moltke obtained the sanction of the King to make provisional arrangements for a march towards the north-east, by which, in the event of it proving correct that the French were actually on the march towards Marshal Bazaine, he would be able to concentrate, on the 28th, at Damvillers, on the eastern bank of the Meuse, seven Corps d'Armées, a force of about 150,000 men, to act on the flank of the French.

But in order to do that, it was necessary to have recourse to a most dangerous expedient. We know perfectly well what the relative positions of the French in Metz and the Germans round Metz were at this period, and that if Marshal Bazaine had then made a determined effort to break out, there can be little doubt but that he would have succeeded. Yet, notwithstanding this fact, of which the German leaders must have been perfectly cognizant, two Prussian corps were ordered up from Metz, in order to effect this concentration at Damvillers. That was owing to the uncertainty as to the exact position of the French forces. It was felt that if they had really started from Rheims at the time alleged, and had marched well, the only chance of stopping them short of Metz would have been at this point; most important it was therefore for Von Moltke to know exactly what was taking place on this main road.

The Crown Prince of Saxony had his head-quarters at Fleury, on the right flank, and he would receive the cavalry reports sooner than would the King; the initiative was therefore left to the Prince, and he was informed that the movement of the troops to the north or north-east might be deferred until 12 o'clock on the 26th, and if by that time no news had been received from the cavalry, then this change of direction was at once to take place; but it was hoped that in the meantime information would have been received from the cavalry which had been thrown out.

Von Moltke was ready to wait till 12 o'clock on the 26th before initiating this movement; the Crown Prince of Saxony at once orders the flanking movement to commence at 5 o'clock on the morning of the 26th; at the same time he sends out his cavalry in accordance with the orders he has received.

The cavalry of the 12th Corps are ordered to bend round, and go into bivouacs at Bantheville. The 5th Cavalry Division were ordered to bend round and try to get through Grandpré, towards Buzancy, whilst the 6th Cavalry Division were ordered to go direct to Tahure, and look out towards Rheims and the north.

I will give you a detailed account of what the cavalry did under those circumstances, obtaining all my information from the official account.

First with regard to the cavalry of the Saxon Corps. They bent round from Clermont, in a north-east direction. When they were ordered to change direction towards the north-east, they left a flanking patrol five miles from Grandpré. Whilst there, there came out from Grandpré a French squadron, which drove this small patrol back on a Prussian squadron, and the Prussian squadron were enabled to follow up the French squadron, who apparently retired through Grandpré, and to send information into the Royal headquarters as to what they saw. The information which they sent in to Von Moltke at Clermont was this: "At Grandpré, and Chevières" (which is a small village close to Grandpré), "hostile troops. *The enemy is retiring at this moment to the northward of Grandpré.* Infantry, cavalry, and carriages are seen, but it cannot be distinguished if they are artillery." Among the many points connected with that, you see

the caution with which the cavalry-leader frames his report. He does not say at once that there *are* artillery, but he fairly owns he cannot see what the vehicles are. Imperfect information is better than a misstatement. Here was this astounding report, that the French are absolutely retiring to the north. That information was sent into Clermont, and reached the Royal head-quarters at 7 o'clock in the evening. The man who took it, had some 20 miles to go (measured in a straight line), and in a strange country; that was very fair riding. At the same time, another Saxon squadron reconnoitred also to the north from Bantheville, and came up to Buzancy (be good enough to remember, only one squadron), and there, to their astonishment, they saw a couple of French battalions, not going to the east, but right away to the west, and information of that was also sent to the Royal head-quarters, and appears to have been received in plenty of time in the evening. Another squadron reconnoitred towards Dun, where it was supposed the French might be in the act of crossing, and they found that the French were not there, and had never been there. That was all the information which was available from the 12th Cavalry Division.

The 5th Cavalry Division started out and attempted to fulfil its mission, but as they approached the Aire they found themselves fired upon, and all the information which they transmitted to head-quarters was to the effect that troops of all arms were around Grandpré, and that they themselves had been fired at. That was all the information which was available at Royal head-quarters before 11 o'clock on the night of the 26th.

The consequences were, that at 11 o'clock on the night of the 26th, the Chief of the Staff of the Army of the Meuse, who was at Royal head-quarters, received orders that the march towards Damvillers was to be continued the following day, and that the two Army Corps from Metz were still to come up there. It may, I think, be assumed that the continuance of this movement is owing to the non-arrival of certain information from Vouziers and Buzancy. That information, and most important it was, was on the road.

While the 5th Cavalry Division were changing their line of march to the north-east, they had thrown out one solitary squadron towards Vouziers. From that, non-commissioned officer patrols had gone out, and one of them under a Serjeant Brohmann sends in word that it has arrived within two miles of this important point (Vouziers,) and that the enemy is posted in considerable force eastward of the town. That information was obtained during the afternoon, but owing to some fault committed by somebody—whether a sore back of a horse, or an Officer not being able to read a map, or a horse having gone lame, or thrown off a shoe, is not recorded—that message, which was so important, and which had to be carried only twenty-five miles, took twenty-four hours in transmission, and arrived only too late. But you may say that was only a non-commissioned Officer's report, and even if it had reached head-quarters much stress would not have been laid upon it; but there was straying about the country a confirmatory report from an Officer of the 6th Cavalry Division. The orders of the

6th Cavalry Division were to go to Tahure and search the country towards Rheims and the north. They did so. They threw out patrols, and Lieut. Von Werthen, an Officer of the 16th Hussars, at half-past five in the afternoon, obtained a perfect view of the French positions at Vouziers, and on the basis of the personal observations of this Officer the 6th Cavalry Division sent the following report to Clermont:—"The heights east of Vouziers, between Chestres and Falaise, are covered with camps of all arms. On the road to Longwe, stand one or two cavalry regiments with a battery and a rifle battalion in front. At Chestres, columns are now emerging from the wood previous to encamping. On this side of Vouziers is a squadron of Lancers. The town itself does not appear to be occupied by infantry. The inhabitants say that there are about 140,000 men assembled at this point. McMahon is at Attigny, and is expected here in two days." This report was supplemented by the statement that the detachments which had proceeded towards Chalons and Rheims had not as yet come into collision with the enemy, but that all the French troops were said to have been sent northward from the former neighbourhood.

Here we find the cavalry have obtained two vitally important pieces of information (and how true they were, can be seen from the positions of the French Army on the 25th, shown on the plan), but owing to some accident, this valuable information from the Officer, which had to be carried only twenty-five miles, was ten hours and a quarter in transmission, and arrived too late to cause any alteration in the following day's march. On the evening of the 26th, Von Moltke was left without any authentic information as to where the French were on that day, and this dangerous movement from Metz had, as has been observed, to continue. The information obtained was, however, thoroughly reliable; and throughout the subsequent days of the campaign, seldom do we find incorrect reports sent in by the German cavalry.

But now by way of contrast let me point out to you what took place on this same day among the French, and really it reads almost like a play. On the 25th the 7th Army Corps, under General Douay, were at Vouziers; they had thrown out an infantry brigade and a battery partly to Buzancy, and partly to Grandpré. The rest of the French Army were executing on the 26th a wheel to the right on Vouziers as a pivot. On referring to the map, we find the 1st Cavalry Division thrown out well to the front, where there are no Prussians at all; the 2nd Cavalry Division is carefully stowed away in rear of the centre, where there cannot possibly be a Prussian. During the 26th, information kept coming in to General Douay at Vouziers as to what was taking place in his front. We do not know who supplied the information, whether it was a Staff Officer or a cavalry patrol, but whoever it was, the information sent was utterly erroneous, and this erroneous information was received with credulity by those to whom it was sent. In the first place you may remember there was a Saxon cavalry squadron out opposite Buzancy. They saw two battalions marching away. These two battalions came in towards

Vouziers, and reported a "vigorous action" at Buzancy. The position of the Prussian infantry on the plan shows the absurdity of that report. Then from Grandpré more information came in to the effect that the Prussians were advancing in force. Now all that was at Grandpré, were detachments of cavalry and the 5th Cavalry Division; and to complete the discomfiture of the French, in came from the south of Vouziers itself a report of the presence of a strong force of Lancers at Monthois. This was Serjeant Brohmann's squadron: nothing much larger had advanced near Vouziers. Here we have a small force of Prussian cavalry magnified into the whole Prussian Army. Of course, General Douay, who was in command, at once thought he was being attacked by the Prussian Army. He ordered his advanced brigade to withdraw to Vouziers, and he drew up his whole Army Corps in fighting order, as the Officer of the 6th Cavalry Division told Von Moltke, and he began to entrench himself. His whole corps remained the whole night in the pouring rain, expecting an attack from a large force. In the meantime General Douay, believing in the intelligence he had received, sends back word to Marshal MacMahon who is in rear, and MacMahon, on the night of the 26th, orders the whole French Army up to Vouziers to receive the Prussian Army, and the consequence was, that the French Army on the 27th, instead of continuing their advance, were drawn up in order of battle, expecting the advance of an enemy who was not within twenty or thirty miles of them.

I know nothing that to my mind conveys more forcibly the importance of having a well instructed cavalry than these instances. I do not understand how any Commanding Officer of cavalry can read this official account without taking most energetic steps to train his Officers and men in outpost duty, or how any cavalry regiment can be efficient, if the Officers, non-commissioned officers, and men are not thoroughly practised in the duties which devolve on them when covering other troops. On the other hand, this account should make us very careful of attributing blame to commanders of armies; here were commanders of armies 200,000 strong absolutely in the dark as to each other's movements, and depending, not on trusty Staff Officers, but on the reports perhaps of a non-commissioned officer of cavalry. Therefore, when Commanders make mistakes, we should give them credit for the difficulties under which they arrive at their conclusions.

These accounts further make us realize the unpleasant fact, that the safety of whole armies is in the hands of individual persons; commanders-in-chief and cavalry non-commissioned officers: the former are like poets, born, not made; it is our own fault if we fail to ensure the latter being trustworthy and reliable.

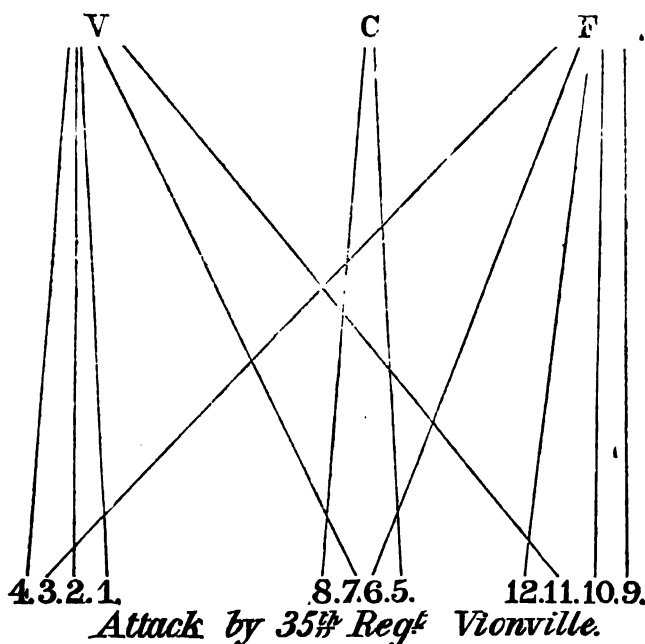
But if this account contains lessons of importance for the cavalry, it assuredly does also for the infantry. Verdy du Vernois, whose name may be familiar to most of you in his "Studies on Troop Leading," of which the translation is being continued by Lieut. Hildyard, says: "Very soon we shall have a large number of young Officers in the army again with no experience of war. It is as well to acquaint them with the dark side of this, for the youthful imagination very seldom

"approaches it of its own accord. The young Officer should be taught "war as it is, so that such occasions may not take him entirely by surprise, but find him prepared to take his measures judiciously. In "war, circumstances occur amongst the bravest and best disciplined "troops which, without the experience of war, would hardly be judged "possible." I suppose that not even the most ardent admirer of the Drill Book will maintain for a moment that we learn what war actually is from that volume; and yet one would imagine from the devotion of some Officers to it, and the ardour with which its most minute provisions are sometimes discussed, that it really taught us everything. So little do I personally believe in this, that had I the honour of commanding an Infantry Battalion I should spend my winter in endeavouring to prevent my Officers and non-commissioned officers and men drawing false conclusions from the Drill Book, and I should do that by bringing instances before them of what actually happened under fire on the battle-field. I know some very clever people tell us that what happened in the last war among the German troops will not happen in future wars among our own troops: they tell you that the Germans were led very badly and recklessly, that the troops got out of hand, and all that sort of thing. I dare say they did; there is no doubt the tactical leading of the Germans in some cases was very faulty, and no doubt in some cases they did act very recklessly; but I think every British Officer may assume that the discipline of English troops will not be more severe in the battle-field than the discipline of the German troops; I think he may assume that the British troops will get out of hand quite as much as did the Germans; and he may assume as a fact, which seems to be almost denied by some people, that foreign powder and bullets will have just the same effect on English flesh and blood as in the last war it had on the Germans. Then they may also assume that whole battalions will sometimes be left absolutely deprived of their Officers; and they may assume that in such cases the companies will go about from one side to another, ranging themselves under the command of the leader who is nearest at hand.

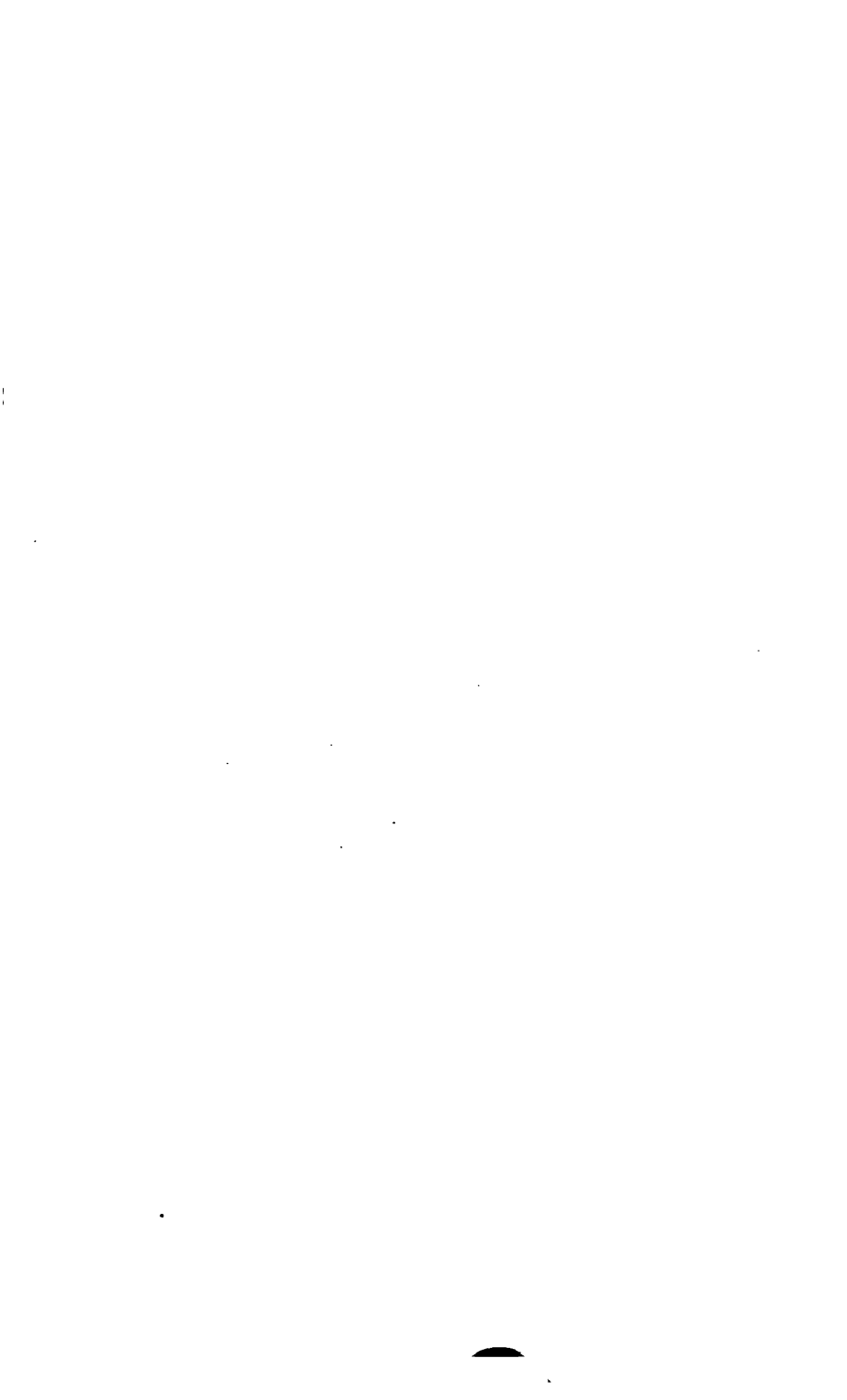
Then if I were this Commanding Officer I should point out that whatever may be laid down in "the Field-Exercise," positions are very seldom won by troops bounding along 50 paces at a time, and eventually forming line two deep, or even single rank, at the position; I should point out that the battle sways backwards and forwards, that the bounds are as often to the rear as to the front, and that a great mixture of troops ensues. The official accounts tell us, also, among other things, that when troops come under fire they take one of two courses. If they are going towards a certain point and are taken in flank by fire from another direction, they will either edge away under the cover of ground to get out of the fire, or else they will turn towards the fire that takes them in flank and endeavour to go forward and meet it.

I should illustrate this by this instance, which is one of the most striking in the book. Sketch No. 2 shows the advance of the 35th Regiment at Vionville. The three battalions of the regiment were given well defined points on which to advance to attack. There is

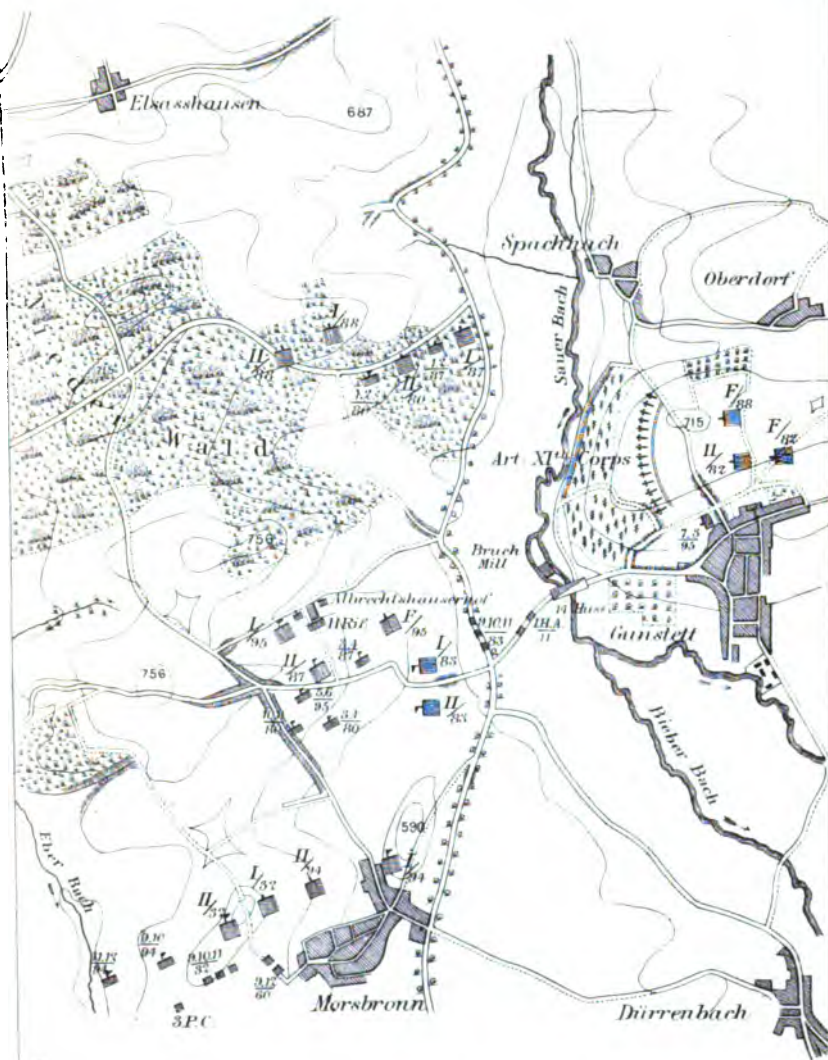
no doubt that the field being new to the Officer who gave the order, he did not quite see the relative importance of these three points. He directed one battalion of four companies on to Vionville; the centre battalion was directed on the clump of trees, and the third battalion was directed on Flavigny. As a matter of fact, these three battalions starting from one line, the centre one had the most difficult task, because the clump of trees lies in a re-entering angle, and the men advancing on it would suffer from the fire from both flanks. Of the first battalion Nos. 1, 2, 3, and 4 were sent against Vionville. The third company



may possibly have been a little in advance of the others, at all events, they found themselves struck by fire from the clump of trees, and they not only bent away to the clump of trees, but right across the battle field to ground 1,000 yards away, and are found fighting at Flavigny: the Fusileer battalion on the right acted similarly; three companies go where they are ordered; but the 11th company finds the fire rather hot from the clump of trees, and absolutely crosses the path of the third company, and is found an hour afterwards fighting at the village of Vionville. Of the 2nd battalion in the middle, the 5th and 8th companies were the rear companies, and the 6th and 7th leading. The fire was very hot from the clump of trees, and therefore the 6th and 7th, intent upon taking the clump of trees in flank, bent away from the direct line of attack, but instead of coming round



Distribution of the Troops of the XIth Army Corps in the Attack on the Niederwald.



his five battalions, starting from the point marked C, to follow him through the wood up to the village of Stiring Wendel. The brigadier started with the leading battalion through a rather dense wood, and struck upon the open at the point D. He then looked round for the remainder of his troops, and found nobody with him, so after fighting a little time, he went back. In the meantime his next battalion had tried to follow him, but they had also failed. They debouched from the wood at the point E, to find that their brigadier whom they were following had gone. The next battalion, comprising four companies split up, two companies following the last battalion, and the other two, arrived at the point F. With regard to the two remaining battalions, a curious incident occurred. General Francois, who, after fighting gallantly and nobly, fell leading a battalion, turned round and saw at the point C, on some rising ground, two battalions. He immediately sent off an officer to bring them up. They were the last two of Von Weynar's brigade, whose original orders were to follow the brigadier through the wood; one comes into the copse, and the other is found shortly afterwards fighting at the house H, two miles away from the right flank of the brigade. I instance that as showing the difficulty of brigade-leading in a difficult country.

Perhaps the most prominent example of the difficulty of unity in command is shown in Sketch No. 6 (Plate XVII). The 11th Army Corps came into the battle of Worth on the left flank, and as they came up they had at once to take part in the engagement. As each brigade arrived on the field, instead of being led *en masse* by the brigadier to a certain point, it had to be broken up and sent to the most threatened points. Therefore the brigades were split up, and the brigade commands ceased. There being three points against which the army corps could be directed, we find troops belonging to different brigades and divisions mixed up at these points.

In the Niederwald, parts of the 80th and 87th Regiments, 41st brigade, 21st division, and of the 88th Regiment, 42nd brigade, 21st division. At the Albrecht'skaiserhof are engaged some of the 87th Regiment, 80th Regiment, 41st brigade, 21st division; 95th Regiment, 43rd brigade, 22nd division; and 83rd Regiment, 44th brigade, 22nd division.

At Morsbrunn we find the 94th Regiment, 44th brigade, 22nd division; the 32nd Regiment, 43rd brigade, 22nd division; and the 80th Regiment.

The accounts in this book go into detail with regard to the companies in the most precise and apparently correct manner, and I do think if an infantry Officer will put aside everything else, and study this book closely and carefully, he will be prepared for almost anything which may happen on the battle-field, and not be liable to be taken by surprise.

I now approach the subject of artillery. After the campaign of 1866, artillery were at rather a low ebb, but since the campaign of 1870 and the Okehampton experiments, there is nothing now that artillery cannot do. With regard to those experiments, let me say as

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an instructor in tactics I rather regret that they were not more exhaustive in one point of view. The artillery at Okehampton smashed cavalry to pieces and slaughtered Major East's infantry, but they did not have any very extensive experiments on artillery itself. For instance, it would be desirable to learn whether Hoffbauer's remark holds good that artillery under fire can execute a flank march; also whether guns, the position of which is indicated only by the flash of the discharge, can be struck by artillery; and we learn nothing about the loss the guns would have suffered from the opposing artillery when Major East's infantry were advancing to the attack. Experiments such as these would have required much time, but would have been of great value.

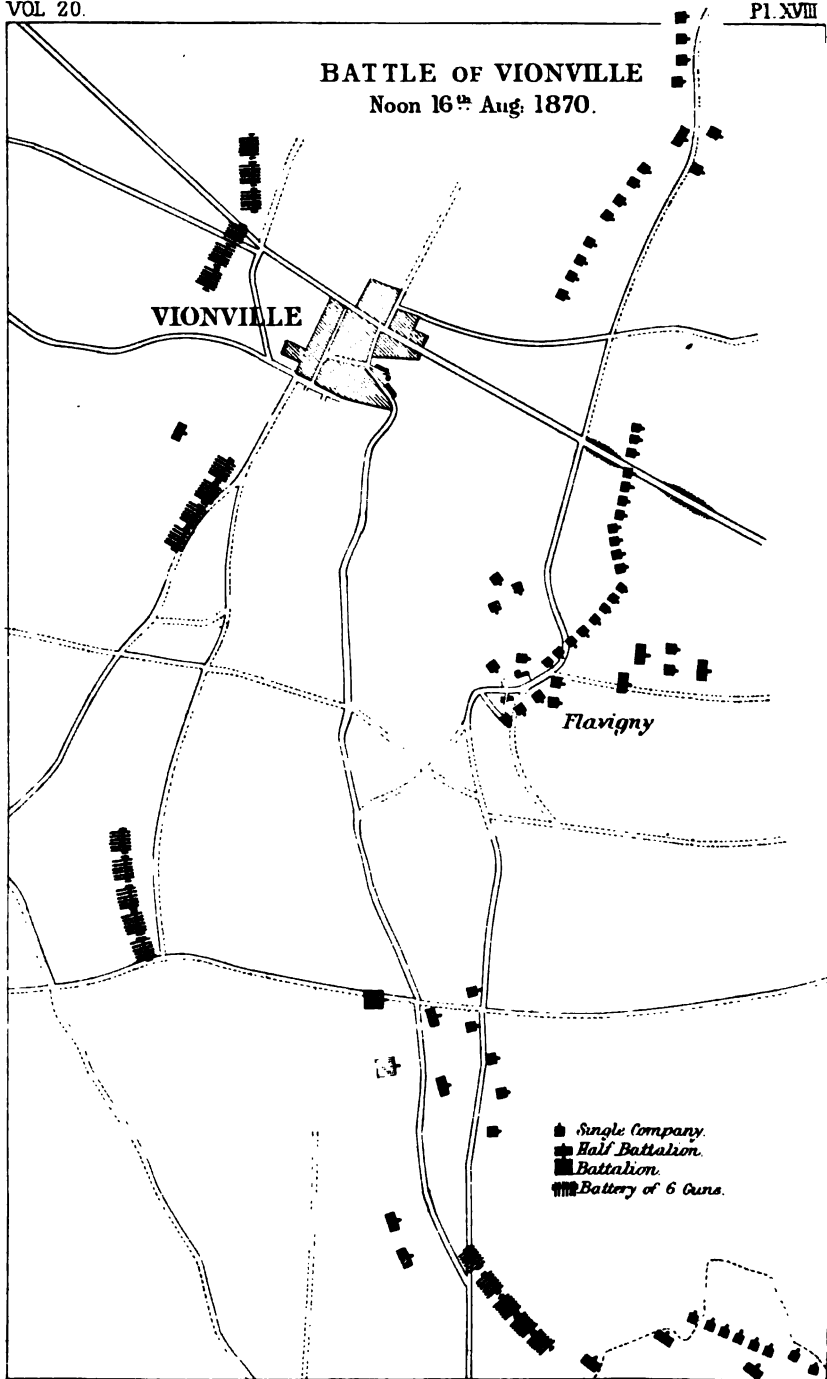
With regard to the statements which Hoffbauer and other artillerymen make respecting the doings of their own arm, it may be remarked that these statements must be accepted with caution, as must also the examples which they bring forward. When I find an instance quoted from Hoffbauer bearing in one direction, I have generally not very much trouble to recall to my memory other instances from Hoffbauer bearing in the other direction. He deals with the battle of Columbey as if it were a great artillery success. But why was it? Because the French did not want to attack the artillery. If we may believe the statement of a French Officer, who has written "Three Months with the Army at Metz," Marshal Bazaine distinctly gave orders to the French not to assume the offensive. Therefore no attempt was made to drive the Prussian artillery away.

The most remarkable differences in the behaviour of artillery under fire occur not far from each other on the same battle-field. The 1st Horse Artillery battery of the 4th Army Corps remained all day in, or close to, the position it took up at 9 A.M., west of Vionville; but the 2nd Horse Artillery battery of the 3rd Army Corps, which came into action at the same time, retired within an hour before infantry skirmishers, when the skirmishers had succeeded in approaching to within from 1,200 to 1,400 paces of the guns. I do hold most strongly to the power of artillery; but the instance most to the point in the earlier battles of the war of 1870-71, of which we have authentic details, tells against the guns. At the battle of Noisseville, which was fought over the same ground as that of Columbey, there were sixty German guns drawn up on a tongue of land running down from Poix and Sevigny towards Metz. The French infantry came down, and before these French infantry, the sixty guns had to retire to the German infantry line. I will give an instance showing the necessity of exercising the caution of which I have spoken, in receiving the details of any fight from a member of a special arm. General Von Bulow commanded the artillery of the 3rd Army Corps, and he has evidently communicated to the Prussian War Office and to Hoffbauer his view of the artillery battle; but Captain Hoffbauer apparently did not quite know what to do when he received this information. He found a certain amount of respect must be paid to the report, but I do not believe he thought for one moment it was accurate. Therefore he adopts the compromise of putting Von Bulow's report in a foot-note.



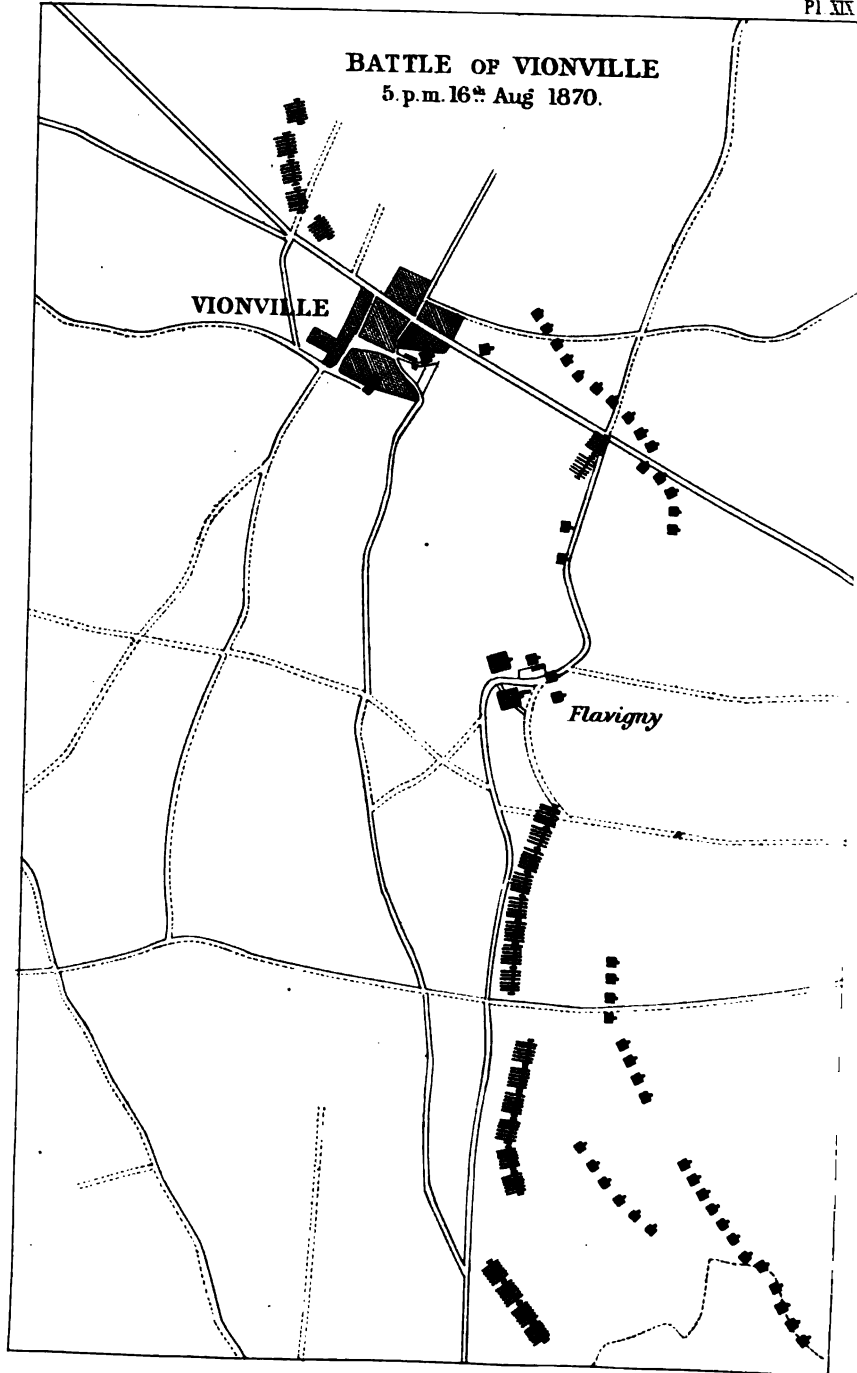
BATTLE OF VIONVILLE

Noon 16th Aug. 1870.



BATTLE OF VIONVILLE

5. p.m. 16th Aug 1870.



J. Jobbins.

"General Von Bulow states that from the time of the capture of the farm "of Flavigny" (which took place at 12 o'clock), "up to that of posting the outposts in the evening" (which took place at 8 or 9 o'clock), "there was not a single infantry soldier within reach of the artillery "of the centre, or, in other words, from the position of the right "wing of the corps of artillery on the hill as far as the 4th heavy battery, near the high road; the farm of Flavigny alone being occupied "by two companies. The artillery was consequently obliged to defend "itself against the attacks of the enemy's skirmishers, which was "done with perfect success." Directly I read that, having also read the official account, I felt there must be some mistake. I turned at once to the Staff account and to the Staff maps, and the sketches Nos. 7 and 8 (Plates XVIII and XIX) are the statements which they furnish. It is a very natural mistake for General Von Bulow to make. A gunner does not look around to see if infantry are coming up to help him, he relies on his guns, and he peppers away on the infantry in front, not caring two straws whether the infantry come up to protect him. The General saw the French retreating, and naturally thought it was caused by his own guns; but the infantry had been really near him in support, and when the infantry came to write their account, they corrected the not unnatural description which General Von Bulow has furnished. That is the clue to what some people think an exaggeration, but which I think merely the one-sided view of what takes place, which artillery Officers give of the actions in which they have been engaged. I do not think infantry have very much to fear in the future. The ground they will have to fight over will be very much like what they have fought over hitherto; and if we take into account the ground, and the fire which will be poured upon the batteries by the assailant's artillery, I think that infantry will find just the same scope for action in the future as they have enjoyed up to the present time.

Lastly, with regard to the corps to which I have the honour to belong, there are lessons for them to learn from this war. I hope I shall not be thought an ill bird if I venture to speak of one little failing of the Royal Engineers. I do not know if they really do possess *any* failing, but if they do, it is attaching undue importance to one word in their motto, the word "*ubique*." They seem to think that the Corps of Engineers can be ubiquitous under all circumstances; and this feeling is rather nourished by the practice of "Peace manœuvres." I do not think any General has ever commanded a corps at "Peace "manœuvres" who will not say that the engineers were ready to go anywhere and do anything required of them; but then there are many Officers of engineers who imagine, because they can be everywhere in peace time, they can be so in time of war also, and in this they are encouraged by the cavalry and infantry. I know there are a great many engineer Officers who imagine that the duty of the destruction of an enemy's communications in front, of his railway bridges, railway lines, telegraph lines, &c., properly belongs to the engineers; and cavalry Officers, who think this work is not in accordance with their brilliancy and dash, say, "Do it by all means." I am glad to find the authorities taking a different view, and we have now started a cavalry

pioneer class at Chatham. I would ask any engineer Officer to take this map (sketch No. 1), and see the enormous extent of country covered by the cavalry divisions, and then try to devise any possible organization of engineers by which he will be able at the right point always to have engineers ready to act upon the communications of the enemy in front. It is absolutely impossible. A cavalry regiment can only be deemed able and efficient to perform its duty in covering the advance of its own army, if it is prepared to undertake a certain amount of pioneer duty as well as those of reconnaissance. On the battle-field, it is just the same; and we have a difference of opinion in our own corps upon the subject. Some Officers tell you: "We will do all the "intrenching;" and an Officer of an infantry battalion, when I urged him to learn a little field-fortification, said to me: "Why should I? "It is your fellows' work, not ours." But I will ask you to take any field of battle you like, and tell me how you can be sure that when an army comes up and gains possession of some position, you can arrange that the engineers shall always be at the right point when they are required. What is more, you will find sometimes, as happened at Vionville and Wörth, that, owing to the necessities of the moment, the engineers have been taken away from their proper duties, and are fighting side by side with the rest of the infantry. My opinion,—and I think it is the opinion of many others,—is that the duties of engineers and infantry on the battle-field must, to a limited extent, be absolutely interchangeable.

I have now dwelt upon the desirability of the study of this book by all branches of the service. I should very much regret if anything I have said should lead you to read this book in order to see what grand fellows your own branch of the service in particular are. That is not the way to study it. It should be studied page by page, paragraph by paragraph, sentence by sentence, line by line, and then you will arrive at the conclusion that an army does not consist of four isolated members, but of four members bound up in the closest and most intimate union; and I venture to think that an Officer who, with an exaggerated feeling of *esprit de corps*, sits down to the perusal to find out something which shall delight him with his own corps, will rise, I won't say humiliated, but humbled. He will find that although on the field of Vionville, the artillery of the 10th Army Corps went forward without any escort and effected most useful results without much harm to themselves, he has merely got to turn over a few pages to find that when, two or three days afterwards, on the field of Gravelotte, the artillery of the 9th Army Corps repeated that manœuvre, they encountered, what I cannot but consider, a crushing defeat. The cavalry Officer who boasts that he can ride down everything because those six squadrons performed prodigies of valour on the field of Vionville, merely has to turn back a few pages, and he will find that a division of cavalry who attacked infantry, unshaken by artillery fire, were compelled to ride back with severe loss. And the infantry Officer who thinks because his arm succeeded at Spicheren, almost unaided by artillery, they can always do so, has merely to go a little further, and will find the Germans themselves admitting that infantry trying to

attack infantry without any aid from artillery must assuredly meet with repulse.

The lesson we here learn is, that if one member of a body be not properly cared for, it becomes weak and inefficient; if it be taken too much care of, and is over-nourished and expanded beyond its right size, it becomes a deformity.

The value of this study will not, I venture to think, be confined to war-time only; it will be just as valuable for peace. The army is a society subject to exactly the same rules as every other aggregation of human beings, and therefore we find that it is not when war threatens us that the bonds which bind us together are in danger of being loosened; it is in the sunshine of peace, when we have not very much to employ our time, that, in the words of the old proverb, "the devil finds work for idle hands to do." It is then that we cease to be to the failings of the other branches of the service "ever kind, to their faults a little blind." It is then that the specks on the characters of the other branches of the service grow into dark ugly spots.

Gentlemen, from time to time there crop up for decision, questions affecting us each and all, questions of vital importance to the service, questions connected with organization, with the distribution of duties, with supersession, with promotion, with appointments to the Staff or other offices. When they arise, the first thing we do is to ask (and not unnaturally), "How will this affect me?" Then, "How will this affect my branch of the service?" And too often, according to our selfish instincts, or deluded by our *esprit de corps* alone, do we form an opinion on the question. But to a man who has studied the accounts of the campaign with which I have been dealing, to him, when such questions come up for consideration, there will arise, almost spontaneously, the recollection of dangers which the four arms have shared in common; of perils which by each other's aid have been averted; of glories which by the unselfish assistance of the other branches his own arm has won; and, softened by these recollections, and bearing them in mind, he will try to come to a decision, animated solely and entirely by that grand principle without which an army becomes merely a collection of armed hordes; that principle which, if it is required, as for aught I know it may be, at Chatham and at Woolwich, is equally wanted elsewhere,—the good of the service first, the good of my own corps, the good of my own branch of the service, it may be the good of the regiment, afterwards.

The CHAIRMAN: I am sure you will all join with me in giving our best thanks to Major Hale for his very interesting lecture.

LECTURE.

Friday, May 26, 1876.

The RIGHT HONOURABLE SIR HENRY BARTLE E. FRERE, Bart.,
G.C.B., G.C.S.I., &c., &c., &c., in the Chair.

MILITARY TRAINING, A MEANS OF ADMINISTRATIVE POWER AND OF POLITICAL USEFULNESS.

By Major-General Sir FREDERIC J. GOLDSMID, C.B., K.C.S.I.

THE subject selected for the Lecture on the present occasion may seem neither inviting nor utilitarian, nor can I lay claim to the possession of those special powers of attraction which make the Lecturer, as it were, independent of his theme. But I will, at least, endeavour to substantiate my proposition by illustration and argument. Succeeding in this, it will be comparatively easy to deal with the later question of practical application. Failing in it, I must hope that your time and attention will not have been entirely thrown away, and it is not improbable that from any after discussion provoked, something of advantage may be extracted.

It has been common to depreciate the public usefulness of military men in an unprofessional sphere. Whether this be the tendency or not at the present moment, when diffused knowledge is doing so much to raise, level, or revolutionize, is another matter. There can be little doubt as to what have been the true causes for such an opinion. In the first place, the preliminary education has hardly been that of the learned professions. Few men who have distinguished themselves at college have become soldiers. Few men indeed who have read up to a high mark in classics are content to forfeit the natural fruits of their reading for the problematical honours of a military career. Secondly, the ordinary routine of garrison duty and the direct requirements of drill and discipline are not favourable to broad intellectual development. Questions that immediately arise to the thoughtful Officer out of his professional experience are so far important in that they affect the comfort and well-being of his fellow-creatures, the honour of his country, and the advancement of science. But they are under serious limitations: human nature is regarded in a state of artificial control,

glory is ever associated with trumpets and weapons of war ; science is purely that of attack or defence. Thirdly and lastly, the social aspect of military life is not such as to leave the outer world impressed with the belief that the school is a good one for cosmopolitan usefulness. The popular notion of a mess-table may not be always the true one, but it is not absurdly incorrect ; and it is difficult to tone down an exaggerated picture, once credited and received, to a guise of truth to which the spectator's mind is unaccustomed. Now, though I am willing to admit that the intellect may not have been fairly exercised for the world in a mere professional routine of soldiering, I maintain that the intelligent and observant Officer who in vigorous manhood may be called from such restricted field of action to public life, has rather benefited than lost ground by his military associations. He has known and felt the value of discipline and organization. He will have to apply them in a less practical and severe form to mankind at large, than has been his wont with soldiers : but he will never regret the absolute experiences of his course of study ; and at the close of his career he will probably arrive at the conclusion that he could not have started on a better basis than that of military training. I am not speaking here of that nominal experience which is required for qualification for promotion in special cases, but of the hard, real training of a soldier, without any claims to exception, or, it may be, without any wish for exemption from the ordinary every-day lot of his fellows.

Let us begin with a boy's education at the period when the abstract profession is the guiding-star to his future. If the pupil is to be a soldier, he must be prepared for Woolwich or the line, and according to the particular fancy of parent or guardian he is sent to a public school, a private school, or a crammer—perhaps from one to the other. Should the boy studiously disposed and self-helping, nothing to my mind, under present circumstances, could be better for him than the English public school ; nothing certainly could be better at any time, were due attention only given to what is called the "Modern Department," an introduction of recent date, and consequently imperfect and of partial use. Such an arena as this, companionship is formed with members of those classes which, independently of recruiting society in its broader sense, commonly supply the nobles and princes of an intellectual world ; and the training and discipline which serve to develop the genius of the ecclesiastic, lawyer, statesman, orator, and poet, would be equally at disposal for the profit of the future military commander. This is a healthy atmosphere in which the latter may safely reside up to the period of examination, whether for further academic and purely professional instruction, or for active professional life. Should a boy, on the other hand, be idle, or indifferent, or wanting in intelligence, I presume that the private school and the crammer may present greater advantages for his tuition than the other. But the process by which a backward or mischievous youngster becomes, as he sometimes does become, a distinguished man, is a little foreign to our present purpose. His personal history is perhaps of itself evidence that he has an exceptional genius, which makes him more or less independent of rule and system, though I should be inclined to

suggest military discipline as the best corrective for his early shortcomings.

Woolwich and Sandhurst have of late years undergone many and notable changes. We may readily believe that these have been effected as much by the spirit of the age as by professional requirements: that they have been worked out, in fact, much in the same spirit as the reforms in all public schools. It is, therefore, reasonable to conclude that the several systems of the several educational establishments in England has been to some extent assimilated as well as the *morale* improved; and that there is at least a stronger sympathetic bond of union between the Eton and Woolwich, or Harrow and Sandhurst of the day than was ever known before. Let us take a passing glance at what has been the standard of military education in one material branch.

An excellent authority on Woolwich, in a work of fiction so closely akin to fact that its evidence is fully equal to that of an official report, thus speaks of the mathematical studies of a cadet thirty years ago: "My course in mathematics consisted of plane and spherical trigonometry, conic sections, statics and dynamics, properties of roofs and arches, hydrostatics, projectiles, and the differential and integral calculus. In this course I had obtained a very good decimal, and therefore might be said to have a fair knowledge of the subjects. I was, therefore, anxious to compare my mathematical knowledge with that of a Master of Arts of Cambridge, and discover, if possible, how much longer it would take me to work up to the extent requisite to become M.A. To my surprise I found that the gentleman from Cambridge knew only as much mathematics as I did when I was in the second class, and, in fact, if I had been at Cambridge instead of at Woolwich, I should have been distinguished all my life as M.A., and should, of course, have been looked on as an authority on such matters as mathematics by people who had no other means of testing one's qualifications than by a literary annex after one's name." But this ambitious tuition may have been overdone, and liable to degenerate into cramming, to the detriment of practical soldiering. For further on he says: "The defect that I experienced after leaving Woolwich was that of considerable difficulty in writing a clear account of any event in a concise and grammatical manner, so that had I been called on to write a despatch, and describe officially some action or title, my production would have been discreditable. I could solve a abstruse question in dynamics, but I could not write three sentences in English correctly. Again, as regards the method of conducting discipline with soldiers, what their pay was, how they were paid, how men were treated for various offences, &c., I was as ignorant as a civilian, and there was then no preparatory training for an officer after joining the Artillery by means of which he could learn these matters." But he adds: "Defects such as the above-named have since been almost entirely removed, while various other matters have been improved at the Academy;" and although apprehension is expressed that "the cadet's comfort is too much cared for," it is

most satisfactory to find recorded the opinion of an experienced Artillery Officer that at this particular hour, it may be fairly asserted on behalf of the Military Academy at Woolwich, it is "perfect of its kind, and the training given there will compare favourably with that of any military college on the Continent."

As regards public schools and what they are, I might quote from many modern tales of real life, not the less true from the use of fictitious names, all charming in their way, and useful in illustrating the popular education of the period. Of these the best known and not the least bright and attractive is "Tom Brown;" but allowance must of course now be made for the salutary reforms which have rendered its darker pictures obsolete. As for the high-minded masters of these institutions, notwithstanding the great individual examples of an age fast passing away, their work and influence have in no wise deteriorated. Still is their teaching of that wholesome kind quite as fitted to the soldier as to the scribe; still is the aim of teaching to go forward; there is just the one reservation to the aspirant's young ambition, and that is, he must not restrict the desire of progress to the narrow limits of personal advancement; the mind must not be narrowed by repeatedly numbering individual steps, or too seriously brooding over cases of individual good and bad luck in promotion, to the exclusion of higher objects. I say nothing on the utility of Chaucer and Greek iambs to a military student. On these, as on other details of army-examination, it seems to me there is room for reconsideration and improvement, without injury to the mental refinement or general accomplishment evidently kept in sight.

To school and college studies the passed candidate will find added drill and discipline, both of which, notwithstanding the instinctive dislike of many novices to either, have to certain minds a positive fascination. Those whose tastes lead them into this particular groove are deserving of every respect: they are the mainstay of an essential daily routine; it is to them we must look for keeping the professional progress of the British Army up to the mark of the continent of Europe. Great attention to the minutiae of dress and carriage is perplexing to some civilians, and is not even always apprehended by the wearer of volunteer uniform: the value of regimental distinctions in respect of tying a scarf, has to my recollection puzzled a superior civilian mind; but I confess to an opinion that where a profession, such as that of arms, has once been adopted, it should be adopted *in toto*. Moreover, where regulation is the backbone of discipline, as in the Army, regulation must be supported and followed, unless suspended or repealed; and so long as common things, commonly expressed, are associated with duty, an Officer's business with buttons and pipeclay is never too trivial to be done carelessly or otherwise than well.

And now let us ask what is the natural result of a constant regard to externals and the physical attributes of man, to the aspect of humanity in its mechanism—if the world will have it so, to the reduc-

¹ "The Gentleman Cadet; a Tale of the Past." By Lieut.-Col. A. W. Drayton, B.A. London: Griffith and Farran. 1875.

tion of a thinking fellow-creature to a passive machine? Is the general tendency of such practice to lower or to elevate? Of its effect upon the ploughman or the ordinary recruit, there can scarcely be two opinions. He rises in the scale of humanity if he only feels that he is somebody beyond the limits of his village; that his name is called over with that of hundreds of his fellows, and of sufficient importance to be missed if not responded to; that, as Charles Kingsley says, "he has a character of his own, and a responsibility and a calling of his own." Not that he might not, and should not feel much of this in his original sphere, but that in nine cases out of ten he does not. His wages, his food and sleep, and his holiday-making, are his pleasures—the rest is work. And here we have the very material once considered the prize prey of the ensnaring sergeant. Experience has demonstrated that the best type of the infantry soldier is to be found among the agricultural and working classes. This estimate has more, perhaps, to do with the actual *physique* than the mental powers; but fortunately for the recruiting officer, in these days of highly paid labour, there is a wider field of selection open, where mind is more on a par with matter. It is needless to detail the various trades and callings represented in the Engineers and Artillery; nor is the line wanting in diversity of elements. As regards the Cavalry, about two years ago it was stated on excellent authority, and in this very room, that many gentlemen who failed at Woolwich and Sandhurst examinations, besides clerks, who could not, with the agricultural labourers, take to pickaxe and shovel work, became recruited into this branch of the service. Men of such stamp winning their commissions, come especially within the pale of our present argument. To them apprenticeship in the ranks is in no way a disqualification for loftier aims—in fine, for the development of statesmanship or administrative capacity. Proof positive might be given of a directly opposite result, so that I am putting forward no new theory.

And why should Drill and Discipline lower the mind of the educated Officer, even if he give his earnest attention to the thorough mastery of the one, and apply his energies to assert and maintain the other? To learn that a man should take 75, 108, or 150 paces in a minute, and that the length of each pace should be 30, 33, or 36 inches; that he should always commence his movements with the left foot; and that his two feet when in repose should form an angle of 60 degrees, is not more derogatory to the intellect of the pupil than would be a study of the alphabet or rudimentary arithmetic. The daily inculcation and repetition of these military aphorisms, with a vigilant regard to their practical observance, may to some minds appear an irksome duty; but in truth the onerous part of the work is borne by the adjutant; and, off the parade-ground, captains and subalterns of companies are hardly more harassed by misapplication or misapprehension of professional rudiments on the part of those under them than the classical scholar is by men who speak in recklessness of grammar or disregard to quantities. Were it otherwise, how, in innumerable cases, would time be spent? What are the occupations to which we *voluntarily* abandon ourselves? Are they one whit more instructive, or

worthy of attention, in an intellectual point of view, than the "balance step" or the "turn of the head in dressing?" Surely there are conventionalities in the world of fashion and *etiquette*, a study and practice of which is imperative upon the highest order of intellect, and knowledge of which is acquired without complaint or consciousness of detriment. Again, some of the most accomplished diplomatists at home and abroad have been renowned for a punctilious regard to ceremonial forms which in themselves are trivial and absurd. In some courts, especially in the East, there is a meaning in ridiculous *minutiae*, the comprehension of which is of vital consequence to the envoy and the cause he advocates. Among Persians, a chair pushed an inch or two forward or backward, so as to transgress the border of a particular carpet marked for its limit, may cause serious offence; a cup of tea, or a tobacco pipe missing from the conventional number offered to a guest, may awake hostile feelings; there may be hidden mischief in a misapplied word of welcome or farewell, in a clumsy gesture, in a new-fashioned article of wearing apparel. Trifles could hardly go farther in the way of puerility; but it is a part of common sense diplomacy to acknowledge with gravity things which are to all seeming the most opposed to common sense. It is hoped that these studies do not unfit the mind for more genial and manly occupation; for if they do, ministers of long experience in Asiatic courts must be incapacitated for transfer or promotion. But as nothing of the kind is admitted, it may be reasonably argued that continuous attention to intelligible and rational details, such as the bearing and behaviour, the dress and cleanliness of the soldier, has no really injurious or cramping effect upon the intellect. Beyond this stage of military routine, drill merges into science, and needs no more defence or explanation than does the presence of grammar in literary composition.

On the other hand, are there not instances in which the constant practice of elementary drill and the continuous maintenance of military discipline supply results which should be instructive even to candidates for diplomatic or administrative honours? The conversion of a throng of awkward bumpkins into a smart regiment of combatants is an experience which has its uses for the statesman as for the soldier; and the habit of enforcing, as of acknowledging authority, is one, the acquisition of which is essentially the duty of every *employé* of Her Majesty's Government. Nowhere, perhaps, can it be so well acquired as in the orderly room and in barracks, and on parade.

But let us go a step further, and look at the captain busied in the interior economy of his company; when the happiness and well-being of many fellow-creatures are more or less affected by his daily ruling and actions. If he possess tact, and judgment, firmness and kindness, and has a sufficient experience, he should prove a good Officer. If he be wanting in these, or any of these—for the four are not always combined—it may be presumed that he will sometimes err. In such case, the best thing that could happen for himself and his men would be the reversal of his decision where it had failed in fitness, and censure in however mild a form. But we will suppose, as we are amply justified in doing, an individual example where practice has led to a

certain perfection: where the captain is as just and wise in his own decrees as he is true to the regulations of superior authority. What training could be better than this for a public yet non-military career? It would teach the diplomatist that breaches are repairable rather by tact than by temper; the statesman that the only true popularity is that born from the belief in justice and good faith, and the diplomatist and statesman both, that the appreciation of men by personal acquaintance, is far more accurate than that derived from report and hearsay channels seldom untainted by bias and interest. It knows nothing of party spirit or of favoritism—it has but one aim, to uphold the discipline of Right. Punishment is administered where necessary, and promotion is only given or recommended where it has been earned by merit. I am not one of those who take legal exception to the abstract justice of Courts-martial, and am, on the other hand, inclined to pin much faith to their findings and sentences. But I will go yet further, and express the opinion that if appointments in high places were distributed on the principles which guide the hard-working regimental Officer with his men, there would be less causes of complaint on the score of unfair supersession than at present. Those who agree with me, and I am sure there *are* some such, will also agree that a lesson of this importance is not confined in its application to the ranks of the Army. It has a universal bearing, and assuredly *are* its influences wholesomely exercised in the sphere of national administration and politics.

But of all the advantages in military training to the public man attaining power and usefulness, none is of higher moral significance than experience of those physical trials and hardships which are incidental to a military career. The prolonged campaign with its chequered journal of success and reverse, the station in a noxious climate with its rolls of pestilence and mortality, the long sea-voyage with its episode of storm and shipwreck, all these situations tend to bring out the nobler qualities of men, to test the stuff of their *morale*, to develop and cement the brotherhood of nature's brothers; and those who have come well through the ordeal, may be congratulated on having served an honourable apprenticeship. This sense of proved manhood and consciousness of having incurred habitual danger, awaken, as it were, the generous impulses of the heart, and lend assistance towards estimating the claims of fellow-men. If possessed by the statesman in power, his perceptions become quickened in the detection of true worth, his sympathies are at once enlisted in the cause of those who have done solid service to their country; he feels a personal pride and pleasure in rewarding the deserving and rejecting the pretensions of men who rely only upon party or family interest. I know not whether I have made myself intelligible in this particular argument, which may, after all, be more a question of sentiment than of logic, but I thoroughly believe in its soundness. It advocates a form of truth which is rather intuitive than prescribed. It speaks for something akin to the boy's admiration of the sailor after his first experience of a boisterous sea, and who can say that such admiration is not warranted and confirmed by the long experience of the man?

It had been my intention, on arriving at this stage in the present paper, to have cited the careers of illustrious individuals in support of my case; but as a lecture provocative of discussion must necessarily be brief, and as the citation contemplated, to have been effectual, should have been full and inclusive of many historical periods at home and abroad, I have abandoned the notion. It is one, however, suggestive of scrutiny, and I would commend it accordingly to abler heads and hands than my own for development. Suffice it now to state, before calling your attention to India, in which country I propose to find the materials for further consideration of our subject, that my original purpose has not been put aside from the consciousness of any lack of individual examples, either in this country or elsewhere out of Asia. For instance, the name of Wellington will naturally offer itself as that of a soldier-statesman of eminence in our own time, whose administrative power and political usefulness owe much to military training. The great qualities which will cause his memory to be honoured, elsewhere than in the annals of military Commanders, were unquestionably matured by the professional life he had led, and the habits he had acquired in that life rather than by any adventitious advantages of birth or family connection. "Such men," wrote a thoughtful teacher, on the eve of the funeral in St. Paul's, "take a century to grow, and we cannot have another such in this generation. If you could find a man equal in genius, you could not have the tried of eighty years until eighty years are gone. This old dull country, which the filigree nations laugh at, with her inconsistencies and her prejudices, how sound at heart she is in the way she does her hero-worship, and what unique heroes her's are! Duty, the watchword of Nelson and Wellington, the last sublime battle-cry of the one and long life-law of the other, and no splash or dash nor French theatricals about either of them. . . . Goodness, duty, sacrifice, these are the qualities that England honours. She gapes and wonders every now and then like an awkward peasant, at some other things, railway kings, electro-biology, and other trumperies, but nothing stirs her grand old heart down to its central depths universally and long except the right. She puts on her shawl very badly, and she is awkward enough in a concert-room, scarcely knowing a Swedish nightingale from a jackdaw, but blessings large and long upon her! she knows how to teach her sons to sink like men amongst sharks and billows, without parade, without display, as if duty were the most natural thing in the world; and she never mistakes long an actor for a hero or a hero for an actor. Men like Arnold and Wordsworth she recognises at last, men like Wellington, more visibly right, at once, and with unalterable fidelity." I have quoted the words of one of a different cloth to that of the military biographer; but the writer was of a kindred spirit to all true heroes, whatever their field or calling.

If I now turn to the Indian Army as representing *par excellence* the field of the English soldier-statesman, it is from the conviction

¹ The late Frederick W. Robertson. See "Life and Letters by the Rev. Stopford Brook, M.A." Smith, Elder & Co. 1868. Page 406.

that within the sphere of that Army, have been found, from the very first, special opportunities—I may say *the* actually desired opportunities—for aspirants to administrative and diplomatic distinction. And here it is that we seek accordingly the more abundant instances of successful administration and successful diplomacy carried out by professional soldiers. From the time of Clive and Close, or the trusted Cornwallis (sent back at sixty-five years of age as the fittest ruler for an Indian crisis), the later days of Malcolm, Ochterlony and Munro, the still later experiences of Burnes and Pottinger, and up to the comparatively recent administration of Sir Mark Cubbon, Sir Henry Lawrence, and others living, in fine for a century and a quarter, there has been no lack of names from which to select illustrations for our purpose; nor is the present generation wanting, nor does it show the least sign of failure in the supply. Let us take a passing glance at quite modern annals.

In the Afghan campaign, however much military men may have been involved in responsibilities which brought both blame and honour to the bearers, it cannot be said that its chapter of disasters was inaugurated by military advisers or soldier administrators. That one of the presumed younger counsellors of the State had “graduated,” as we are told, “in the learning of the camp, and that his after studies “had done much to perfect his acquaintance with the tactics and “strategy of modern warfare,” is unimportant evidence, because in the first place I am not limiting the notion of military training to a “little learning,” and secondly a question has been raised with regard to the precise counsel here tendered.

The administration of the Province of Scinde under Sir Charles Napier was, without doubt, the outcome of an enlightened military view, of which the wisdom was proved by after events. Those who succeeded him in government were not ashamed to admit the successful results of his practical statesmanship, and the noble spirit in which he worked. Few readers of the “Administration of Scinde,” chronicled by a distinguished historian, will cavil at the writer’s reference to the surprise felt by one of England’s greatest Ministers at the extraordinary talent for his work of the military Governor. “It cannot be supposed,” he fairly argues, “that Sir Robert Peel’s “astonishment sprang from the vulgar, contracted English notion of “military men’s intellects; he must have known that a consummate “captain cannot have a narrow genius, and that service in every part “of the globe must have furnished such a person with opportunities “for observing different forms of Government.”

After the annexation of the Panjáb and British Birmah, it was on military Officers that devolved much of the work of organization and settlement; and the records and present condition of both provinces bear testimony to the thoroughness and ability with which this important duty was performed. In types, such as illustrated by Herbert Edwardes, Nicholson, and others whom it might be invidious

¹ Kaye’s “History of the War in Afghanistan.” Book II. Chapter 4.

² “General Sir C. Napier’s Administration of Sind.” By Lieut.-General Sir William Napier, K.C.B. London: Chapman & Hall. 1851.

to specify, but some of whom are still breathing and in harness, is to be found the stuff not only of warriors but of diplomatists. To my humble apprehension of the powers of this class, the only element it *may* want of completeness is the polish of European practice, the habit of the *salon* and the Continental tongue. Where this is combined with the ruder and more essential experience of camps and Oriental Courts, we have at once the ready-made statesman or ambassador, if not for every service, then for special service only. But we should remember that these *specialities* are of vital moment. It is with the greatest respect for recognised authority and the diplomatic service, and in a spirit, I hope and believe, of ingrained conservative loyalty, that I venture the suggestion, to test somewhat more freely than heretofore the skill of soldiers in unravelling political knots. They will be able to use the sword, if all other methods fail; but it is a vulgar error to infer that a knowledge of its uses would lead them to resort causelessly to the Alexandrian remedy.

The Indian Mutiny, with all its horrors, was not to this country a mere episode of storm and darkness. Its flashes of light were as penetrating as vivid, and served to disclose the faces of good and true men in crannies where they would have been unobserved at ordinary noontide. Here the crisis demanded, as it were, a military head for immediate action; but the causes of the crisis, and its whole course of treatment, were subjects for statesmen and administrators. Yet in this notable instance, while civilians grandly came forward to help their military brethren in the hot work of physical suppression, it cannot be argued that soldiers were wanting in the council chamber. That was, indeed, a time for India to distinguish efficient workers from "hard bargains." The cant phrase of "right men in right places" then derived peculiar significance. In many instances, unsuspected heroes arose out of circumstances; for there never was a fitter opportunity to bring forward and recognise solicitants to deserve well of their country. But an Empire like British Asia should not be dependent on circumstance to find her true supporters. Her Government should always know those whom it would be of advantage to consult on the occurrence of a crisis, whose sword is the sharpest and truest, as well as whose judgment is the most profitable to direct. A crisis *did* arrive in 1857; and truly fortunate—let us say Providential—it was that the authorities at the helm of affairs, and less widely responsible executives, had in themselves sufficiently the elements of greatness to be qualified for the all-important task which then devolved upon them.

A military man, in India, does not come to civil employ, as may be supposed, without some technical knowledge of his new duties. The details of "Revenue" work present to his mind a certain novelty, and need close and careful study. Much common sense and sound reasoning power are indispensable to their mastery; and in instances where centralization has overstepped the mark of local requirements, it may be that regimental discipline will be found useful in practising that which is not always approved. But in judicial matters it is otherwise. The intelligent Officer, conversant with military law and practised

in courts-martial ranging from regimental to general, has practically nothing to acquire but form in the civil dispensation of justice. His appreciation of evidence is fully up to the mark; so also are his knowledge and estimate of native character. He will not have dealt solely with *sipáhis*, but his personal experience of *bazárs* and cantonment will have brought him in contact with a sufficient number of types to fit him for the bench or *kachhari*. In olden times, when *sipáhi* battalions were not what they are now, when a smart adjutant might have been a little king (I am recording, not upholding, *this* contingency), there were few better schools for young and legitimate ambition than the staff of a native regiment. The kind of experience there acquired was precisely that needed to secure efficiency in after public life. The ground-work was admirable. Among the lessons to be learned were self-reliance, discrimination, industry, patience, and energy. The man who could fail to profit from these would not be the man for responsible posts at all, no matter his cloth or profession.

If, then, in modern Indian history, the military element of Government has been tried out of its own legitimate sphere, and found equal to the ordeal without any actual training for other than strictly professional work, may we not naturally infer that the school in which the soldier-statesmen or soldier-administrators of British India have been reared, possesses elements of usefulness beyond the range of a parade ground or field of battle? On the other hand, if we analyse the brilliant successes achieved by civilians, do we not, without in the least detracting from the intrinsic merit of individuals, acknowledge that they often indirectly result from the possession of those very qualities which make good soldiers, rather than from any professional instruction or preparation—nay, more, that these qualities have ripened and developed by association with camps? The ready welcome, in contradistinction to the disguised avoidance of responsibility, denotes a condition of mind which seems to me of all others that which is most fitted to deal with an emergency, because it implies a consciousness of power, in itself a guarantee of success. And one who has been used to active military life; to work in trenches, or watching on outposts; to eat, drink, and sleep within distance of likely shot or shell; to encourage the living and attend the dying, under circumstances of peril and despondency; should have had a better training in this respect than that of polite or classical learning and literature. I may go further, and assert that even one who has had to carry out a mere routine of garrison discipline, in the absence of superior authority, is a more qualified and promising candidate for responsibilities of the severest kind, than are many skilled diplomatists whose experiences have been acquired in the closet.

And now to wind up the argument, as it were, which I have had the honour of submitting, and with which I may have had the misfortune to weary you, and to come to a practical conclusion. If it be allowed that the profession of a soldier not only does not disqualify him for general usefulness in public life, but rather fits him for certain offices outside the limits of his professional range, then let us see what are the channels of employment more manifestly open to him.

The common-sense answer will be: "Give him a position befitting his particular experience, proved qualifications and idiosyncracies." There is, however, another consideration of no mean importance to be taken into account—one of more general tendency. "What are the questions of the day in which the opinion of thinking military men would be of most value, and what the appointments out of their own professional sphere which they are the best calculated to fill?" It shall be my endeavour to supply a brief but comprehensive answer to this very pertinent enquiry, afterwards leaving the whole matter to your disposal in discussion.

The question of the highest political interest to England at the present hour is that of Turkey and her struggles. Three years ago it was that of Russia and her encroachments eastward. Next year the excitement may be caused from another quarter: but I think the attraction will still be towards the East. In fact the "Eastern question," of which so much has been heard and on which so much has been written, may be only now in its infancy: for it has many phases and belongs to a vast region both in Europe and Asia. To meet the difficulties now presented in a wise and fair spirit, no legitimate aid should be despised, and no available means neglected, whatever objection be offered on the score of existing prejudice and wanting precedent. Ministers at home should have the most experienced and best informed counsellors at their beck and call: ambassadors and envoys abroad, especially in the countries more immediately concerned in, or affected by the threatened crisis, should be the most thoroughly competent men for their posts. Knowledge of national character and of mankind at large, appreciation of passing events, tact, loyalty, zeal, discretion—above all the sense and power of responsibility, should provide the *personnel* of the diplomatic staff, from the Ambassador and Envoy Extraordinary to the Vice-Consul and Consular Agent. We must never be at fault on the threshold of our work—that is, in the preliminary knowledge which should form the basis of our diplomacy.

But let us pause to ascertain how the matter really stands. While fencing for an open route to India, and holding cautiously back from the counsels of continental Empires which foreshadow stupendous changes, yet exercising a certain moral and passive interference not without dignity or political drift—do we really know as much as we ought to know, and could know on the state of Muslim feeling from Constantinople to Delhi? In India we should have abundant data to guide us: but it is a long, long line from the Bosphorus to the Indus, and the whole of the vast intervening tract is peopled by the votaries of Islam. These Muhammadans are not to be classed as of one family—as all Roumelian Turks, or all Anatolians, or all Persian Shiâhs, or Uzbegs, Afghans or hybrid Indians. Yet they are liable to be so considered on the authority of travellers in European Turkey, Asia Minor, Central Asia or India, as the case may be, each viewing the general Muslim in the local specimen he has seen. An electric link of brotherhood is said by some to connect the whole of the followers of the Prophet; so that a blow to the wide-spread religion effected in

Morocco is felt and resented by the Tungán in Mangolia. Though I do not subscribe to so sweeping a theory, I think it very important that we should know the true state of things: and I am sure that independently of published volumes, there are many travellers who could give valuable testimony on the subject—some for Anatolia, some for Persia, some for the dismembered Khanates of Central Asia, some for Túrkiстан, and very many for India—testimony, which massed in a single blue-book, would have its lessons and its uses for diplomatists. Two-thirds of the witnesses would, I venture to affirm, be military men; several of whom I could name as having been actively employed in exploration between the Caspian and Káshghar, since I myself returned from Persia towards the close of 1872. And if this question, to be rightly apprehended, requires the testimony of soldier travellers, it is not unfair to suppose that for its solution the counsel of soldier travellers would have especial value. And not only these, but of soldier politicals also—men who know the Muslim as a priest, as a soldier, as a peasant, as a friend—in other words in his fanaticism, in his fighting, in his simplicity, in his social life. It strikes me forcibly that this minute knowledge is the true basis on which we should mould our diplomacy—a knowledge which, while it enables us to approach Muhammadanism without undue prejudice, ready to admit its merits as its defects, in no way prevents its treatment in a Christian spirit. In fact, thus qualified, we bring to the sick man the skill and intelligence of a practised physician, instead of the experimental remedies of an ordinary practitioner.

We are told, and on sound authority, that the Sultan of Turkey is prayed for in the Indian mosques as a recognised head of religion: we are told that he is, as it were, the acknowledged Khalif or Pontiff of the Muslim world; and we are taught to infer that his right to religious supremacy renders our support of this greatly embarrassed potentate an essential feature of our Oriental diplomacy.¹ Now, if the Indian Súnni, because he offers up prayers for a name which he cannot explain, at a distance of thousands of miles from the *habitat* of the Sultan, is to be held up as a sign of the vast power, moral or spiritual, centred in the Golden Horn, how shall be interpreted the indifference of the Arab in Turkish Arabia to the same supremacy which is ever present before his eyes in the form of a material sovereign rule? In illustration of my meaning, I recall a circumstance which occurred to me, when in those parts. While watching some Arab workmen digging a trench for the telegraph-cable at a point where the mingled waters of the Tigris and Euphrates flow into the sea, an elderly, respectable-looking native came up and accosted me. We got into general conversation, and among other things he asked what I knew of the Sultan? Was it true that such a person really

¹ Very shortly after the reading of this paper, a telegram reached London, announcing the actual Sultan's deposition. The report of his suicide followed. Could we learn to what extent the communication of this intelligence has affected the Muslims of India, we should have a good and useful illustration of their appreciation of a tragedy which might naturally be supposed to interest them deeply.—E. J. G. [How much more so since the second Sultan has been deposed, and a third raised to the Throne.—Ed.]

existed? Or had the British, as he had heard, carried him away from Stambúl? Questions of this description, if genuine, as they really appeared to be, are hardly indicative of the sentiment of a sensitive Semitic people, doubtful of the welfare or bewailing the possible captivity of a spiritual chief. But the matter is one on which there should be no room for doubt. It is too grave to be left to individual opinions, or the judgment of single, and it may be biassed counsellors. The division between the Persian Shiáh and the Turkish, Arab and Indian Súnni is too well known to need more than passing mention.

I have spoken of one phase only of the Turkish difficulty; because it seemed to be the one more applicable to the subject of this paper, as suggestive of a field for the employment of intelligent and locally experienced Officers. For my own part I have sufficient faith in the cloth to believe them capable of dealing with the whole question of the Herzegovina and States south of the Danube: but shall not attempt to argue out so startling a proposition. If, however, military men be deemed in any way, intellectually or professionally, worthy of consultation in respect to the Eastern policy of Government, or to be employed as agents or executives in negotiations, explanations or complications arising from the present disturbed state of the Turkish Empire, there is another field in which they will readily find no less legitimate or congenial work. I need hardly say that allusion is intended to Central Asia, where British explorers have already made their mark, and where British *prestige* should on no account be suffered to decline. The subject is one worthy of far more time than can now be spared for it: but a very few words may define two means for the utilization of competent Officers which I do not think should be neglected. One is the continued collection of topographical and political data: the other the arrangement of *all* reliant data into a form available for ready reference. The first implies systematic travel and exploration: the second, the organization of a Central Asian *bureau* in London, a scheme on the merits of which I have before written, and in the policy of which I honestly believe. Again, would it not be a wise move to attach an intelligent Indian Officer to the embassies at St. Petersburg and Constantinople, and, perhaps, even two to the legation of Tehran—not for purposes of obtaining secret information, according to the habit of less civilised days, and after the fashion of the Oriental news-writer, but openly and in the broad light of day—for the purpose of communicating with the Indian Viceroy and Government when necessary, and advising, when required to do so, with Her Majesty's Ambassador, on points of vital importance to British interests in the East, however immaterial in the West? Such a dignified recognition of the *employés* of our Indian Empire would show the value attached by the home Government to the British Indian Army; would be highly appropriate at the present juncture; and could not produce other than beneficial results.

A few words in conclusion. I anticipate one possible answer to my case as it now stands, in the very natural remark that a soldier should keep to his profession: *ne sutor ultra crepidam*: and that it is

unwise to unsettle his mind and cool his military ardour by diverting his attention to foreign aims and objects. This is really my own view. The Army cannot afford to maintain and educate men for the Civil Service. Such a measure would be destructive of all efficiency. I also know and am ready to admit the force of the fact, that many good Governors of Colonies, or Presidencies, have been and may still be selected from the ranks of military men, whence also come Special Delegates and Commissioners.

But let me solicit your attention to the matter in the following light. Active service is comparatively rare. If amid a host of able and good men wearing Her Majesty's uniform, it be thought that some of the number could be more useful to their country than in the particular form of occupation to which they are tied by a garrison life, half-pay, perhaps even retirement—at any rate, by some not extraordinary or incomprehensible contingency, would it not be well to test them in posts where any particular merit they may have already displayed, foreshadows just the kind of efficiency required? It surely is no reflection upon the civil or diplomatic services to assume that certain appointments, at certain times, usually held by civilians or diplomats, might be better filled by soldiers trained by nature and circumstance to the particular duties required than in the ordinary routine of departmental promotion. An Officer of the British Army in diplomatic costume, would present no more startling novelty at St. Petersburg or Constantinople, than at the less noted Tehran, at Warsaw or at Cairo; or than he would do, were he to appear in the simple uniform of his military rank at any of these cities. But as the question is one of principle, the specification of posts or places is unnecessary. If in the event of any nomination such as here contemplated, the nominee were pleasantly conscious that military training, so far from being a drawback to his usefulness, had been found a means of increasing it, the point which I have deferentially, if earnestly, pressed, would have been established.

That I have confined myself in these remarks to one branch of the State Service must be excused by the nature of the subject discussed. But I may, on the other hand, *en revanche*, take the opportunity of recording a conviction that there are civilians whom a very little practice would make not only good soldiers, but good commanders; and that judging from the events of comparatively recent years, we need not go far to find an illustration of the truth of the theory.

The CHAIRMAN: I would ask any gentleman who has heard this able and eloquent lecture to favour us with any remarks or criticisms which may occur to him.

Lt.-General Sir R. WILBRAHAM: I may perhaps be allowed to make one remark with regard to the latter part of the Lecturer's statement. I was employed for three years, attached to our embassy in Persia, and the part I rather think the lecturer has laid a little too much stress upon is, the value of information on special subjects, and especially on the feelings of the natives, that might arise from Officers residing or travelling through those countries. I was there during a very anxious time, just before the Afghan War broke out, and when Eastern affairs, though for less imminent than they are now, certainly created a much more anxious feeling throughout Europe. Lord Palmerston was then our Secretary for the Foreign Department, and Sir John McNeill was our Minister in Persia, and there was a great deal of anxiety felt at the progress of Russia in the East. But what I should

like to ask both the lecturer and our distinguished Chairman is, whether the fact of the Mutiny having broken out so unexpectedly in India does not show us how almost impossible it is for Europeans living in the most intimate way with the natives to ascertain what their real political feelings are. I do not think you can exaggerate the value topographically of our being thoroughly acquainted with these countries, but from my own experience in the East, and from reading very carefully the history of the outbreak of the Sepoy Mutiny, it does not appear to me that it is possible for Europeans to have the slightest idea of what is going on in the oriental mind.

The CHAIRMAN: As I have been appealed to on this point, perhaps you will allow me to say a few words on that and on the subject of the lecture generally. First, with regard to what has been said of the difficulty of any European ascertaining the real feelings of Asiatics, I may say that at all times, and under all circumstances, it seems to me extremely difficult for a man of one country, unless he has been living in the most intimate relations with those of another country, to interpret their real feelings as a native would. But I am quite sure that the difficulty is less in the case of military men than with those of most other professions, and if I were asked, I should say that military men, as a rule, have better opportunities, if they care to use them, in India than most other classes for knowing what the real feelings of the natives are. It is not always that their knowledge is as easily available to the Government of the country or to the public as that of other classes. There are some who, like the missionaries and merchants, have no particular reason for concealing what they know or keeping it back, who may have peculiar facilities for publishing what they know; but as regards ascertaining the feeling of the natives of the country, I should say that there is no class which has better opportunities than military men in the sort of employment for which Sir Frederic Goldsmid has argued that they are so peculiarly fitted, I mean particularly the Political Department of the Indian Government. On the two occasions to which allusion has been specially made, during the Afghan campaign and the Indian Mutiny there was always the most accurate information obtainable and obtained, and very often communicated to the Government, by military men, both those who were with their regiments and those detached from them on political duties. As a matter of experience, I can say that during the whole of both periods, when I was in India, I never failed to hear from military men what afterwards proved to be true. Unfortunately, it was not always possible for this information to be laid before the Government of the country in such a convincing shape as to influence the action of the Government, but that was no defect of the observer and no fault of his. Perhaps one characteristic of the military observer which prevents his being recognised as an accurate index of native opinion is that his habits of official reticence are somewhat stricter than those of other classes. A crucial case is that of the Indian Mutiny, and I know as a matter of experience that in all three armies there were Officers who pointed out the defects which led to the Mutiny; pointed out the exact feelings of the natives, neglect of which gave bitterness to many of the actions connected with the Mutiny, and that if these men had been better known and more listened to earlier in the day, much of what happened might have been foreseen and prevented.

On the general subject of the value of military training as an education for diplomatic employment, as a civilian who for upwards of forty years has been on terms of the greatest intimacy with military men in civil employment, I can only add my testimony, such as it is, to that of the many civilian who have recorded their opinions of the inestimable value to the Empire of India of the services of military men in civil, and especially in political or diplomatic, employ. The cases to which the lecturer has referred were some of them under my own observation, more particularly in Scinde. Both the conqueror of Scinde, so well known to you all as a military man of the highest genius, and some of those who followed him—I will only now speak of those who are no longer among us, men like General Jacob and Sir James Outram, and others who might be named—I can testify that as civilians they were in no way inferior to any men that I know who were trained exclusively in civil life. There were parts of Sir Charles Napier's administration, notably I may say his police, which were perfect models of administrative capacity in their conception and in the way they were carried out. And I may mention that Sir

Charles Napier once told me that the whole of his scheme of police for Scinde, which has been more or less since adopted throughout India, was turned over and perfected in his own mind as he sat on the rocks of Cephalonia, looking at the opposite coast of Albania. He then said to himself, "If I were told, as Major Napier, "at this moment to take charge of that mountainous country, full of troublesome "spirits, how should I get to work about it?" And he said at that time, when he had one sergeant and half a dozen Greek constables as his whole police force, he elaborated in his own mind, and got ready to put down within four days, all the great features of the most perfect police system that I know. That seems to me a tolerably good instance of the way in which a soldier may at the time of his most active service, or the service which seems to be least productive of the means of self-improvement for civil education, fit himself for great civil administration. There is a point which to my mind has always seemed one of the most important with regard to the employment by the State of those of the military profession who could be brought to turn their attention to civil affairs, and that is the extremely high standard of duty which the military profession everywhere inculcates. I do not mean to say that there is not as high a standard as you could possibly have in all branches of State administration in England, but it is a great thing that you should have some of your men selected men, the best men of a profession which habitually does not look to mercantile results or rewards, which does not look for immediate payment in pounds, shillings, and pence; and the soldier, who always looks to duty as the first thing incumbent upon him, who always considers that his duty must be done whether any one is looking on and praising him, or whether he is perfectly alone, and who feels above everything his reward is to have done his duty,—he has learned the great secret of the best administrative ability that is to be obtained in a country like ours.

I think I may interpret your feelings in returning the thanks of the meeting to Sir Frederic Goldsmid for his very interesting lecture.

OCCASIONAL PAPERS, NOTES.

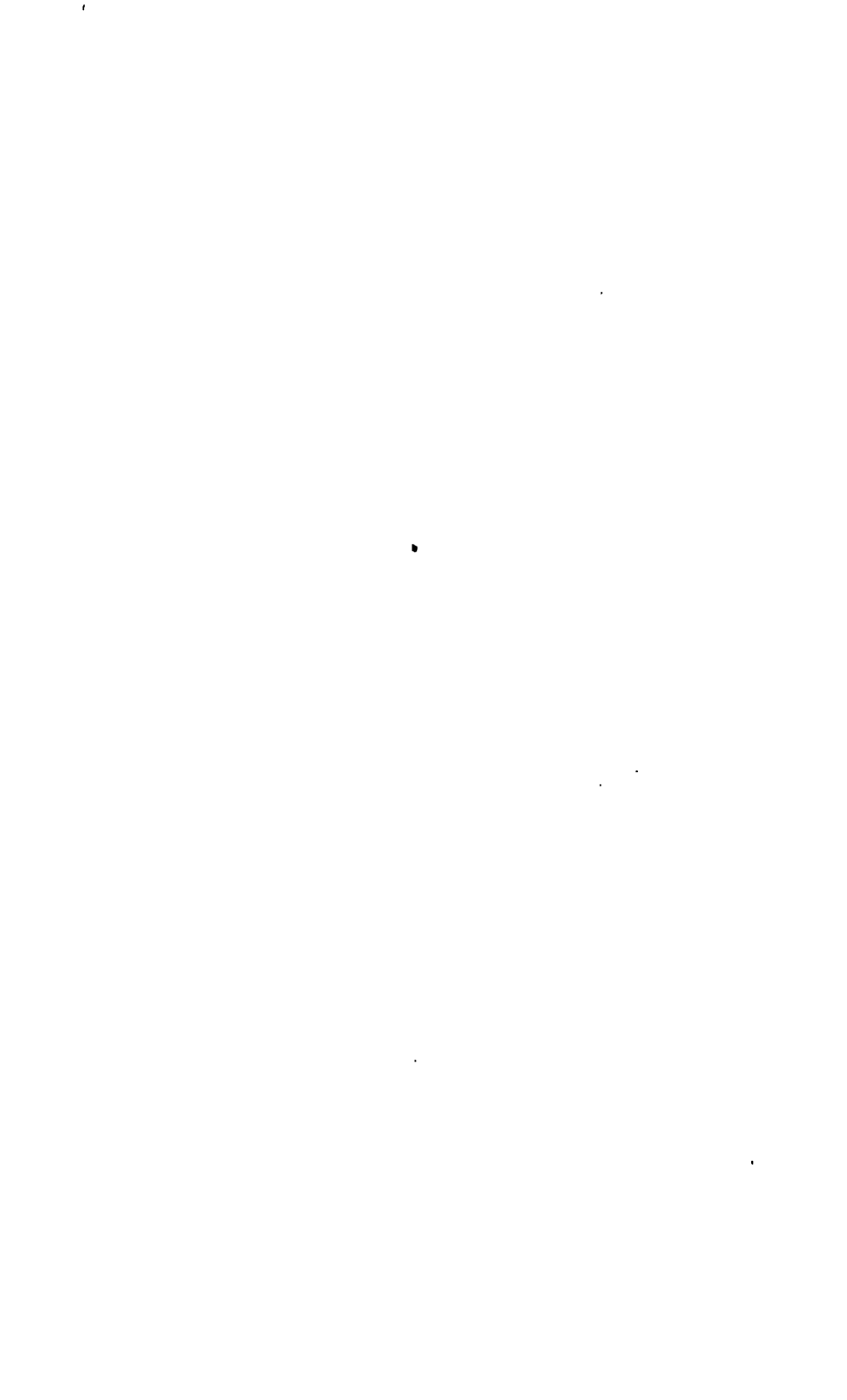
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THE AUSTRIAN ARMY IN 1875.

By Colonel Sir LUMLEY GRAHAM, Bart.

WHILST all European powers, great and small, have been more or less busily engaged in remodelling their military organization and in preparing their armies to meet the requirements of modern warfare, no one of them has been more active in this respect than Austria, and, eminently conservative though she be by nature, no other nation has, we believe, effected such radical and sweeping changes in the constitution of its forces and in its tactical system.

This is hardly to be wondered at, for, with the exception of France, no other nation has, since 1815, been exposed to such grave military disasters. The last and most serious of these misfortunes effectually roused the statesmen and soldiers of the empire to a sense of its military deficiencies, leading them to imitate, and, in some respects, go beyond the adversary who had given them such a severe shock. There was, indeed, much room for reform, and it may truly be said that Austrian military institutions have been reformed in all their branches.

In the present paper we shall devote ourselves more especially to tactical questions, and particularly as relating to infantry, making merely a passing allusion to the changes of a more general character, which have been effected in the Austrian military system, and which have been carefully analysed in the pages of that excellent periodical, the "*Revue Militaire de l'Etranger*" (January—June, 1874). It would hardly be possible to find a better guide in the prosecution of our inquiries than the one we have selected, the well-known soldier-author, Lieutenant-Colonel von Kühne, whose able and exhaustive analysis of some of the principal operations of the war of 1866 must be familiar to many of our readers ("*Kritische und unkritische Wanderungen*," &c.).

Colonel von Kühne visited Austria last summer, and attended some field exercises, also the inspections of several infantry regiments and of a field artillery regiment, near Vienna, proceeding afterwards to the camps of instruction at Bruck and Salzburg and, lastly, assisting at some divisional manœuvres which took place in the "*Puster-Thal*," in the Tirol, under command of Lieutenant-General Count Thun-Hohenstein, military Commandant of Tirol and Vorarlberg. The Prussian Officer, who was everywhere received with the greatest cordiality, had thus a good opportunity of studying the new tactics of the army against which he had fought so successfully a few years before, of noticing the

peculiarities of mountain warfare, unknown, except in theory, to soldiers of his nation, and of making himself acquainted with the practical working (as far as can be seen in peace-time) of the system last adopted for the defence of the rugged frontier-lands which have so often been the scene of conflict. He communicated the observations made during his tour to the "Militair-Wochenblatt," in an article¹ which we have before us, and of which we propose to give a short abstract, with a translation of some passages of peculiar interest.

The principal object of Colonel von Kühne's journey appears to have been to study the military arrangements in Tirol, the principal part of his pamphlet being devoted to them, and his observations upon what he saw of the Austrian Army elsewhere being given very briefly, notwithstanding which they constitute, in our opinion, not the least important part of the little work under notice, and that which will probably be of the greatest interest to the English reader.

Our author, according to the laudable practice of his countrymen, goes to the root of the matter, and, before proceeding to describe the arrangements made for the defence of the mountainous region which is the subject of his essay, prepares the way, by a dissertation, firstly, on the general characteristics of mountain districts as affecting warfare strategically and tactically; secondly, on the influence exerted by local circumstances in such regions on the employment of the different arms and the execution of military operations. His views upon these matters appear to us sound and well-stated; but, as there is nothing new or original in them, and as, to use his own words, his object in giving them is only to "recall briefly to his readers' memories "things long since known," we think it advisable to pass over these prefatory chapters, so as to have more space for matter of greater interest.

The next chapter treats of the proper strength and composition of military bodies acting in a mountain region, of the importance of a local militia therein, and, lastly, of the organization of the forces in Tirol. The following remarks appear to us specially worthy of notice:—"All European powers have adopted the army corps organization, which is admirably suited to ordinary warfare, but bodies of 25,000 or 30,000 men cannot be handled to advantage in mountainous regions; even divisions of from 12,000 to 15,000 men are too large; and it will be found preferable, from every point of view, to break up such formations into smaller bodies of from 3,000 to 6,000 men, chiefly composed of infantry, but with a mountain battery and a small detachment of cavalry, and to give such bodies great independence of action, supplying each with a due proportion of transport and supplies of every description, also with signalling and pioneer detachments, and all necessary tools. To make each little column thoroughly self-sufficing, as it should be, it should further be provided with pack-animals, as well as with wheel-transport."

The inhabitants of a mountainous district (particularly when the

¹ "Der Krieg im Hochgebirge, die Organisation der österreichischen Wehrkräfte in Tirol und Vorarlberg und die Divisions-Uebungen in Tirol im September, 1875."

mountains attain a high elevation) are a great value for its defence, and in almost all instances of mountain warfare, they have taken an active part in the operations (witness the campaigns of 1703, 1796, 1799, and 1809, in the very regions of which we are now treating). Local knowledge and the hardiness acquired in mountain life render them peculiarly fitted for performing the duties of light troops on ground which is most trying to men whose abode is in the plains. But, in order to make the most of such good material in war, previous organization in peace-time is requisite. The mountaineers must be enrolled in corps of local militia, properly officered and trained. Their presence would give the defensive force a great advantage over an invader in mountain warfare.

Inhabitants of Tirol and Vorarlberg, capable of bearing arms, have been for centuries organized for the defence of the country, and even now occupy a peculiar position in the general military scheme of the Austro-Hungarian empire.

It will probably be of interest to our readers, if we enter somewhat into details upon this subject, and, before doing so, some general remarks upon the law regulating military service throughout the empire are indispensable. The personal liability to military service of every citizen is the fundamental feature of this law. Those subject to it are enrolled in the standing army, in the war navy, or in the "Landwehr." Men joining the army or navy are retained three years in active service, passing afterwards, for seven years, into the reserve, and, in the case of soldiers, for a further term of two years into the "Landwehr," but those directly enrolled in the latter force, remain in it for twelve years. The Landsturm is composed of volunteers who do not belong to any of the other military forces. The reserve, for recruiting purposes (Ersatz-Reserve) which is calculated after ten years (reckoning from 1868), to attain the strength of one year's contingent for the army (fixed at 95,000 up to 1878), is intended to supply, immediately on the outbreak of war, a number of recruits equal to the strength of the annual levy. These men will at first be distributed amongst the depôts, whence they will be told off to corps as required. Men of the "Ersatz-Reserve" remain liable to service in the army or navy up to the completion of their thirtieth year, after which they join the "Landwehr" for two years. The latter force is intended to support the standing army, and for internal defence in time of war, whilst in peace-time it may be used, in cases of emergency, for the maintenance of order and security. The "Landsturm" is embodied as an extreme measure, and acts as a support to the standing army, and to the "Landwehr" within the realm.

The only regiment of the standing army which is recruited in Tirol and Vorarlberg is the "Kaiser-Jäger Regiment." The Colonel is ex-officio Commandant of the recruiting district in which the corps is raised. The regiment consists of seven four-company field battalions, seven reserve companies, and one depôt battalion, of which last only the cadres of seven companies are kept up in time of peace. The districts of Tirol and Vorarlberg having thus to furnish a relatively small contingent to the standing army are expected to contribute, in

greater proportion than the rest of the empire, to purposes of local defence, and are therefore subject to a special law for the purpose.

The first law for the organization of the Tirolese forces was, we are told, enacted as far back as 1511, in the time of the Emperor Maximilian, since which period it has been altered more than twenty times, in order that it might be brought into harmony with existing circumstances. Many of these enactments, however, never came into force. Originally, the Tirolese militia, or first levy, as it was called, was supposed to consist of 20,000 men, divided according to age into four classes, and only liable to be called out for a service of 100 days, but no organization was prepared in peace time, and the companies were only formed when war actually broke out, the communes usually raising the required contingent of volunteers by appeals to patriotism and to the pocket. A certain number of companies were thus made up, composed of men hurriedly scraped together, and mostly serving for the sake of the bounty, hence not the best of material. Still, the Tirolese sharpshooters rendered good service on several occasions. Up to 1864, the Tirolese militia continued to be raised on the voluntary principle, and the result was far from satisfactory, either in the wars of 1848 or of 1859. Long discussions upon the question ensued, resulting in an ordinance issued in 1864, which established the principle of the general liability to service, for home defence, of all inhabitants of Tirol and Vorarlberg.

The militia was by this law divided into three classes:—

1. The organized rifle companies, 6,200 men; length of service, four years.

Officers elected by the men. The latter were frequently assembled in small parties for drill, and the companies were called out, once a year, for three weeks' training.

2. The volunteer sharpshooters. No fixed establishment. Length of service, also four years, or till the conclusion of peace.

They were expected to take part in target-practice, whenever possible.

Officers elected by the men.

3. The "Landsturm," composed of all able-bodied men, between 20 and 50 years of age, and not belonging either to the army or to classes 1 or 2 of the militia.

This state of things was an improvement on what had gone before, both on account of prolonged service, of improved organization, and of the recognition of the principle of universal liability; but the election of Officers by men was maintained, a very serious defect, and moreover the arms provided were not of the best. The new organization was barely completed when the war of 1866 broke out. In the course of the campaign, 35 companies of riflemen (*Landesschützen*), about 4,000 men, and four companies of volunteer sharpshooters, about 2,000 men, were actively employed, being attached by Major-General Baron Kuhn, commanding in Tirol, to the demi-brigades into which he had divided his regular forces. Towards the close of the war, the Imperial Government appealed to the people "to defend their native land to the last extremity." Whereupon, 10 companies of *Landsturm*, about 1,500

men, were quickly raised in North Tirol, and over 2,200 men, within 48 hours, in South Tirol. According to the Austrian official account of the war of 1866, the whole local force enrolled in Tirol and Vorarlberg consisted of—

1.	8 battalions of riflemen	4,012 men.
2.	19 companies of volunteer sharpshooters ..	2,696 „
3.	187 „ of Landsturm	36,412 „
Besides	2 „ of Tirolese from Vienna	320 „
Total		43,440

The great measure of military reform which was applied to the whole Austrian Empire by the law of December 5, 1868, could not but affect the arrangements for local defence in Tirol and Vorarlberg. Accordingly an Act was passed on December 19th, 1870, supplemented by one of May 14, 1874, for regulating the organization of militia and Landsturm, and the provisions for target practice.

The local forces are now composed as follows :—

1. The Landesschützen (Militia Rifles), who form a portion of the general Landwehr of the Empire, and are organized in peace time into ten battalions and two squadrons; four companies to the battalion. In war-time, they form ten field battalions, ten reserve battalions, ten dépôt companies, and two squadrons. The establishment of a field or reserve battalion is 23 Officers and 967 men (of whom 18 Officers and 913 men are combatants), besides 40 men trained as gunners; that of a dépôt company is 4 Officers and 236 men. In peace-time, a cadre is kept up for each rifle battalion, consisting of 1 Field Officer (Commandant), 1 Officer for administration, 4 Officers for instruction, 30 non-commissioned officers and privates.

The establishment of a squadron on the war footing is 1 Captain, 4 subalterns, 180 men.

A cadre is kept up in peace-time for the two squadrons of 1 Officer and 30 men.

This constitutes the dépôt in time of war.

The horsemen are recruited from the population of the whole district, being selected as specially apt for the particular service for which they are intended, namely, that of scouts and orderlies.

The rifle battalions are recruited :—

1. From the Army reserve and Recruiting reserve of Tirol and Vorarlberg.

2. By direct enrolment of able-bodied men of the military age who are not required for the Kaiser-Jäger Regiment.

3. From volunteers who have already served their time and are still fit for service.

The length of service is—

Two years for men who have already served their time in the standing army or in the recruiting reserve.

Twelve years for men enrolled directly in the local militia.

Two years, or for the duration of a war, for volunteers.

The Tirolese militia is in the strictest sense of the word a local

force, and can only be employed in foreign parts with the consent of the District Assembly. It is under control of the District Defence Commission (Landesvertheidigungs-Oberhörde), composed partly of Government officers, partly of members of the District Assembly, the military Commandant of the district being also commanding officer of the militia.

The corps of officers is at present composed as follows :—

1. Of those already serving in the local militia, when the new regulations came into force.
2. Of officers fit for service on the pension establishment.
3. Of aspirants, natives of Tirol and Vorarlberg.
4. Of such qualified non-commissioned officers of the local militia as are able to pass the reserve officer's examination.
5. Of officers transferred from the standing army to the Mounted Rifles.

The supply of officers will be kept up :—

1. By the transfer of officers on full pay from the standing army.
2. By enrolling in the militia, or by temporarily attaching thereto reserve officers.

There is an officer's school at Innsbruck for training militia aspirants.

Non-commissioned officers and privates of the second category (see above) have, if in the infantry, to turn out for training during eight weeks, those in the Mounted Rifles, and those told off as gunners, during three months, in the course of their first year's service.

The field training of the militia rifle battalion takes place in autumn, and consists in alternate years of battalion-exercises for three weeks (battalions taking part in turn in the army corps manoeuvres), and of company drills for a fortnight, together with target practice at the communal ranges. All militia men may be called out for battalion-exercise, but only men of the second category during their first six years of service for the company drills.

Militia men (except those coming out of the army reserve) must put in an appearance at least twice a-year, for a day each time, at communal target practice.

Unless a Government range be available, each commune has to provide one at least 600 paces in length, and to keep it up, together with all necessary appliances, the State, however, supplying arms, ammunition, and equipment similar to those issued to the "Kaiser-Jäger Regiment." Target practice is superintended by instructors chosen from amongst the militia non-commissioned officers, and the "marks-men" (Scharfschützen). The latter title is given to riflemen who particularly distinguish themselves in shooting, and confers certain privileges, the most important being extra pay when on service, and dispensation from attending target practice unless as instructor.

When embodied, militia men are on the same footing as the line as regards pay, pensions, &c.

Militia men cannot emigrate without permission.

Every inhabitant of Tirol, unless in the standing army or militia, is liable for service in the Landsturm from his nineteenth to his forty-

sixth year. The first levy consists of the younger classes up to forty years of age, its members being bound to serve both in their own and the neighbouring districts; the older men, on the other hand, who compose the second levy, can only be called upon to serve in their own districts. Landsturm men cannot be embodied for more than fourteen days at a time. Men liable for service in the Landsturm are already in peace-time enrolled in sections by the communal authorities. These will afterwards be organized into companies and battalions.

A company must not be less than 150 men, nor exceed 300. Battalions must be between 500 and 1,000 strong.

(In other parts of the empire the Landsturm is still to be recruited by voluntary enlistment alone, and no provisions for its formation are made in peace-time.)

The officers will be elected when war is imminent. Section-leaders by the men of their sections, the choice being limited to those who have been officers or sergeants in the "Kaiser-Jäger Regiment." Section-leaders will choose the captains; these again the major, quartermaster, surgeon, and chaplain. The choice of major is subject to the veto of the Defence Commission.

Both officers and men wear their ordinary clothing, with a light green arm-band, having on it the battalion number. Arms, ammunition, and equipment, are provided by the State.

The regulations for target-practice form an important part of the scheme of defence for Tirol and Vorarlberg, being calculated to prepare and work up the elements of a defensive force without actual military organization. This applies more particularly to the Landsturm. The formation of rifle clubs, under sanction of the authorities, is encouraged. A club must consist of at least twenty members, each of whom must take part in at least three practices of individual firing annually with his own club, besides a practice of rapid independent firing. Ranges, &c., are kept up at the expense of the club, which, however, receives an allowance from the State, also money prizes for encouragement of good shooting. Practice is carried on according to army regulations. The members of each club choose from amongst themselves two officers to preside at the ranges, also a committee of management. The whole system of target-practice is under the Defence Commission, the rifle clubs of Tirol and Vorarlberg being respectively under general superintendence of an officer called the "Landes-ober-Schützenmeister," which title we will leave it to the reader to translate. There is an annual "grand national rifle meeting" (Landes-Fest und Freischiessen) at Innsbruck, Botzen, Trient, and Bregenz in turn, supported partly by State funds, partly by local contributions.

The system of defence thus briefly described is evidently a great improvement upon any system before in force in Tirol. It has not, however, as yet been long enough in operation to be carried out in all its details, and as its successful working depends much upon voluntary effort, the active sympathy of all officials, and indeed of the whole population, must be enlisted in its favour. Much depends upon the military commandant, who is also, *ex officio*, a member of the

Defence Commission and commanding officer of the militia. It is of great importance, particularly during the present period of transition, that this post should be filled by an officer of tact, energy, and vigour, moreover, one acquainted with the people, and popular. The Austrian Government appears to have made a good selection in Lieut.-General Count Thun-Hohenstein, the present commandant.

It is to be hoped that he will be supplied with sufficient funds to carry out the system in all its integrity. It would be false economy not to do so, but to such false economy there seems to be unfortunately some tendency in Austria.

The war strength of the militia rifles (*Landesschützen*) is estimated at about 20,000, about the same in point of numbers as the first levy of the old Tirolese force, but their efficiency should be far superior to that of the latter, which until quite of late years received no military training whatever, was badly equipped, and only bound to serve 100 days.

Colonel v. Khüne says, that he was unable to ascertain the exact number of enrolled militia men, or how far battalions and companies had been exercised, but that he was convinced from what he heard and saw, that in case of war, ten field and ten reserve battalions, fairly trained and thoroughly well equipped, would be turned out available for service at the shortest notice, whereas in the war of 1866 Baron Kuhn could only dispose at first of 4,500 men between militia and volunteers, their total strength actually in the field never quite attaining 7,000.

Besides which, the *Landsturm* is now in course of organization.

The divisions which took part in the manoeuvres of 1875 was composed as follows:—

1. Standing army—

The Kaiser-Jäger Regiment (Tirolese Rifles) ..	8 battalions.
7th Regiment of Infantry	3 ..
53rd	3 ..
9th Garrison Artillery battalion	3 mountain batteries.
1 Section for Signalling.	
1 Section for Hospital Corps.	

2. Militia—

The Rifle battalion of Bruneck	1 battalion.
A detachment of Mounted Rifles	50 horsemen.

The militia battalion only took part in one day's manoeuvres.

As already mentioned, the Kaiser-Jäger Regiment furnished eight battalions to the manoeuvring force. Two of these were, however, provisional battalions formed out of the reserve companies; one of the seven field battalions of which the regiment is composed being in garrison at Hainburg,

The Austrian infantry peace establishment is very small, too small for efficiency, that of the Kaiser-Jäger being 80 rank and file per company, that of the line regiments, only 70. The 53rd Regiment was particularly weak, having suffered much from dysentery, and its

companies did not turn out more than from 40 to 50 men. (It should be remembered that Austrian battalions have only four companies).

A mountain battery has both in peace and war four rifled three-pounders. Its peace establishment amounts to 4 officers, 40 men, 9 pack-animals, and 4 riding horses; in war there are 48 pack-animals and two country waggons, or 63 pack-animals, where there are no carriageable roads.

They carry 120 rounds per gun. Each animal has to transport about 280 pounds (English) weight. The ammunition consists of common shell, shrapnel, and canister. The effective range with shell does not exceed 1,000 paces.

Great attention has been made to signalling in the Austrian service. At the manœuvres in question, large white triangles and white disks were used instead of the various coloured flags formerly employed.

The troops never once bivouacked, but were always quartered on the inhabitants. Provisions were obtained by contract. The meats were cooked in portable camp kitchens. The manœuvres lasted four days, a day of rest intervening between the second and third. The scene of operations was the district known by the general name of "Pusterthal" (Puster valley), a district really composed of two valleys divided by a small and nearly flat plateau elevated about 4,000 feet above the sea, and forming the water parting between the basins of the Drau (or Drave), and the Etsch (or Adige), the former of which flows to the Euxine, the latter to the Adriatic.

Both the valleys and the intervening plateau are well cultivated, and the former contain several villages and the town of Bruneck. The Pusterthal is of considerable strategical importance, affording the most convenient means of communication between Tirol and Carinthia, both by road and rail. The mountains which enclose it are of varied formation and are much intersected by ravines, valleys, and water-courses. The Pusterthal and its vicinity afford some good tactical positions and appear well suited to the practice of mountain warfare.

In Colonel v. Kühne's pamphlet, will be found a good map and a minute description of the district, also a careful account, followed by a critique of each day's operations.

Our space will not admit even of an abridgement of these instructive chapters, and we must content ourselves with some quotations from the author's final remarks upon the operations generally.

The division was formed daily into an eastern and a western force which acted against one another. The operations of each day were entirely independent of those which preceded and followed them, no general strategical idea being worked out, as at Prussian manœuvres.

Hardly any instruction was given in outpost duty, no pickets being posted by night.

The object of the manœuvres was mere tactical instruction, to which, when you consider the nature of the country, it was judicious and perhaps inevitable to confine them, as to work out a strategical idea a much larger field of operations must have been traversed, and turning movements in such a region being necessarily widely extended

and slow, more time would have been required than was available. The want of practice in outpost duty and in forming bivouacks, appears to have been a serious omission from the programme, and to have been due, in great measure, to considerations of economy, which in such a matter can only be misplaced.

The general and special ideas for each day's manœuvres were given out daily on parade, orders consequent thereupon being issued verbally on the ground. It is well that Commanding Officers should be accustomed to do this, but the habit of reducing an order to writing should also be cultivated, as to do so clearly and at the same time briefly, is by no means easy.

The map issued for the manœuvres was on a very small scale; 1 : 144,000, and was based on old surveys requiring much correction. The Austrian military authorities prefer this small scale, because they think it would be inconvenient to Officers to carry about larger maps on service. The Prussian Army, however, during the late war was provided with maps of France on the scale of 1 : 80,000, and the troops investing Paris received maps of the environs on the scale of 1 : 20,000. (The one-inch scale chiefly in use in the British Army is, of course, as 1 : 63,360).

The following remarks upon the different arms, of which we give a summary, are founded, not only upon what the author saw in Tirol, but upon the observations which he had the opportunity of making elsewhere.

Austrian regiments differ very much from one another, both in the bearing of the men and in their tactical efficiency. This is intelligible when we take into account the great variety of nationalities to be found in the Imperial Army, and, consequently, the great number of dialects spoken therein.

Colonel v. Kühne thinks that the regiments recruited in the German provinces are the best drilled, and remarks that this is not to be wondered at, seeing that the great majority of Officers throughout the Army are of German nationality; and though there are probably more good linguists in the Austrian Army than in any other, Officers being required by regulation to know enough of the language or *languages* of their men (for sometimes three or four different tongues are spoken in the same corps) to be able to communicate with them on matters of duty, yet, it is evident that under such circumstances, instruction is likely to be incomplete, and all the more so on account of the short term of service.

The Infantry.

The Kaiser-Jäger regiment distinguished itself particularly amongst those in the Pusterthal. It has the advantage, as already stated, of being recruited in Tirol and Vorarlberg, where the material is excellent. Fine upright men, strong and active, capital marchers, and inured to mountain work.

Whilst tactical reform in the Prussian Army has been progressing upon the principle of "*Festina lente*," the conservative spirit of the

higher military authorities having acted as a drag upon any rapid advance, in Austria the tendency has rather been to go into extremes.

In the former country, the last new regulations are only a reprint with emendations (considerable 'tis true) of those of 1847, which again are founded upon those of 1812, whilst Austrian Officers of the higher ranks have in their time had to make themselves acquainted with five or six "Field-exercise"-books differing considerably from one another. The one at present in force appears quite up to the times, perhaps even going too far in some matters. For instance, having wisely concluded that the gigantic losses of 1866 were due quite as much to a mistaken system of tactics, founded upon the action of masses and upon the shock, as to the superior armament of their enemy, Austrian tacticians ran into the extreme, not only of forbidding mass-formations in action, but also any sort of bayonet-charge, unless under very exceptional circumstances. They appear to think that positions may be carried by fire alone, the skirmishers shooting their way up to the enemy and pouring into him a heavy and rapid fire at close quarters.

In consequence of this, the attacks of Austrian Infantry seem to be tamely executed.

"It is all very well to show no masses until you come to the actual onslaught, to the final rush, but at that moment the assailant cannot do without them and must put up with the losses which are inevitable when they are employed."

When on the defensive, the same false principle naturally made itself apparent.

Troops in position retired without waiting for any positive attack as soon as the assailant was supposed to have fired sufficiently long and heavily. The author quotes the following passage from the latest edition of the "Field Exercise," to show how little reliance is now placed upon the bayonet, the use of which was, as we know, so strongly advocated in the period between 1859 and 1866.

"The bayonet attack must only be employed, as an extreme measure, to drive an enemy from his position when the latter has been completely surprised, or when he has been so thoroughly shaken by fire that he cannot be expected to offer further resistance, or when to remain any longer in the effective zone of fire, would seem to promise a heavier loss to the assailant than would a vigorous advance. It will, therefore, not be judicious, leaving the idea of surprise out of the question, to order a charge until your fire has obtained its greatest degree of intensity.¹ Still less excusable would it be to ground your dispositions for attack upon a bayonet-charge. This should, on the contrary, only be the natural consequence of the effect produced by the greatest possible development of fire."

It is with the last two sentences that the Prussian critic and we also are chiefly inclined to quarrel, for, however requisite it may be to prepare the way for an attack upon good troops well posted and armed

¹ The principle advocated in this sentence, at least, appears to be both sound and to have been recognized as a maxim by all European armies, including that of North Germany.

with breech-loaders, by the utmost development of artillery and rifle-fire, yet such troops will not be dislodged by fire alone, and resort must finally be had to the bayonet, upon the use of which, therefore, as an *ultima ratio*, all our dispositions for attack should be grounded. We are disposed the more to insist upon this, because we think that many of our own tacticians are inclined to favour the false maxims as to attack noticed as prevalent in Austria.

The Austrians wisely lay great stress upon the careful use of cover to shelter troops from fire, but, says von Kühne, "this must not be carried to the pitch of avoiding open ground, where the tactical situation positively requires it to be traversed. One can't always choose one's own ground, witness Spicheren and St. Privat; and we must, therefore, accustom our infantry to cross ground unfavourable to the attack in the most suitable formation and in the most practical manner. We remarked, however, on frequent occasions, that Commanding Officers appeared to make dispositions for the attack out of keeping with the general situation, solely for the purpose of avoiding open ground. We cannot, moreover, see any advantage in the practice of making skirmishers run over this sort of ground in a stooping attitude. It is very doubtful whether they gain thereby the advantage of better cover, and there is no doubt that their advance is retarded and their *morale* impaired by the practice. Another thing struck us pretty often. They appeared to extend their front too much with the idea of making the most of their fire. The line of skirmishers, long and unwieldy, was not properly backed up by reserves in close order; commanders seeming in general to let their troops get out of hand too soon. When each side aims at outflanking and turning the other, the tendency to undue extension is only too easily developed, and it seems, therefore, advisable to combat this tendency by assuming a deeper formation. The importance of keeping a reserve in hand for the final crisis must also not be lost sight of in presence of the fire-arms now in use. Lines of skirmishers were often to be seen firing into one another for a long time at too close quarters, supports also approaching too close to the line of fire in open ground."

There are two very remarkable peculiarities in the new Austrian tactics:—

1. The importance given to the "Zug" as a sub-unit. The captain handles his company like a little battalion, giving only the cautions, while the Zug leaders give the executive words of command. The Zug is not confined to its original position in the company any more than is the latter to its original position in the battalion.

2. The so-called "Vorwärts-sammeln" (forward gathering).

Bodies of troops, either in close or open order, are taught to avoid loss, in crossing dangerous ground to gain a forward position, by practising themselves to do so, the men being trained to rush or creep across either individually or by files. After the party is re-assembled under cover, the forward movement is re-commenced anew in the

¹ These unrealities are common enough at "sham fights" in all countries, not excepting Prussia.

same manner, the point of assembly being each time indicated by the commander. Colonel v. Kühne thinks that the Austrian Officers and soldiers do not yet enter into the spirit of the thing, and remarks that the movement was generally performed by the successive advance of Schwärme (groups) or of Züge (divisions)¹ very much after the fashion practised for some time back in Prussia and now adopted in most armies; moreover that this mode of advance was often employed when not required by circumstances, thus causing needless delay, and that it was often omitted when it would have been clearly of advantage. The supports moved too often up to the skirmishing line to fire volleys, and the said firing was frequently kept up too long. Colonel v. Kühne counted on one occasion eighteen such volleys fired one after the other. A very unnatural performance. The practice, too, of making men take ground to a flank, when in the skirmishing line, or immediately behind it, for the purpose of avoiding intermixture of units was frequently noticed and is strongly to be reprehended, as such a practice must necessarily be given up on actual service on account of the heavy losses which it would entail without any commensurate gain.

The Prussian observer, although making the above depreciatory remarks, was upon the whole favourably impressed by what he saw of Austrian infantry. They are well-drilled and their "fire-discipline," is very good. They have made remarkable progress in all respects within the last few years, and the steady, quiet manner in which they manoeuvre, is remarkable.

"Not a sound was to be heard except the words of command and the shrill notes of the whistle, and we often noticed how a shout from the commander and a wave of his sword sufficed to lead a 'zug' smartly from one position to another. They have worked hard and well, and already much has been done."

The men seem to be well trained in the minor operations of war. Patroles were well conducted, and gave good information, though German-speaking men were not always to be found. This is very inconvenient, but an inevitable evil in the Austrian army. One very good practice was noticed. Each captain and "zug"-leader in the skirmishing line kept two or three men about him to carry orders and messages. (This institution, and also that of the whistle, used only to call attention, might be introduced with advantage into our service as a means of facilitating the direction of long lines of skirmishers, or of half-companies, distributed as in our new formation for attack).

The Austrian "Konzentrirte Ausstellung," answering to the

¹ The company is sub-divided into Züge and Schwärme. There are four Züge in a company.

The number of Schwärme in a Zug depends on the strength of the latter. The Schwärme must not consist of less than four, or of more than seven files.

The Austrian peace establishment is so low that it renders the Schwärme and Zug identical.

We saw the "Vorwärts-Sammeln" practised in our own army many years ago, long before the practice was adopted in Austria. But it was not sanctioned by authority, and was only, as far as we know, practised by one corps, the 2nd battalion 19th regiment, whose commanding officer, Colonel R. Warden, was, as a tactician, far in advance of his age.

"Rendezvous Stellung" of the Prussians, or to our own "line of quarter-columns," is worthy of notice. It consists of battalions formed in line of company-columns. Distance between the company-divisions (züge), 6 paces; interval between companies, 3 paces; interval between battalions, 12 paces. A regiment of three battalions advances to the attack in the following order:—

No. 1 battalion, with its four companies in line, or in line of company-columns, the leading division of each company skirmishing. The movement is continued without a check up to within some 400 or 500 paces of the supposed enemy, the skirmishing line being meanwhile reinforced by the second division of each company. The supports follow close behind the skirmishers, generally remaining in column.

Nos. 2 and 3 battalions follow the movement, either in the "concentrated" order above described, or in "line of columns," i.e., line of company-columns at deploying intervals plus 3 paces. During the advance of the leading battalion and the subsequent standing-fire which it maintains at a distance of from 400 or 500 yards from the enemy, the other two battalions gain ground upon it and move up to the front, as a rule simultaneously, one prolonging the line, the other acting on the flank of the enemy. It is rare to see one of the battalions kept back in reserve.

The further advance to within about 100 yards of the enemy is executed by the "forward-gathering" process already described, the skirmishers being seldom reinforced by the third divisions of companies. As a general rule, these, together with the fourth divisions, move close up to the skirmishers, deploy, and fire a great many volleys.

"A little before the assault the fire is increased to the utmost: rapid independent firing from the skirmishers, volleys from the supports. The assault itself is executed by only a portion of the line, covered by the fire of the remainder, bugles sounding the advance, skirmishers and supports rushing on with loud hurrahs. At this moment no reserves are kept in hand, not even bodies of any strength in second line. Fire is kept up on the retreating enemy in a very effective manner."

The Prussian observer, when comparing Austrian infantry with that of his native land, was struck by the comparative looseness of the former, in drill and appearance, to a certain extent also in discipline, at least as regards externals. "Smartness" and "pipeclay" (zopfwesen) seem to have been discarded in Austria together with the old white tunic. But, on the other hand, the free movements, the long, easy stride, the quick step, did not fail to impress the looker on favourably.¹ Even the lively swing of the left arm in marching, at first annoying to an eye accustomed to Prussian parade-stiffness, was admired after a time, because in keeping with the rest. Many things in every army strike a foreign observer unpleasantly, because he is unaccustomed to them, but he must not conclude that a practice is bad merely because unfamiliar to him. What is suited to the genius of one army and

¹ Really, however, the Germans seem to get over more ground in a given time than the Austrians. In an article in the 179th number of the "*Revue Militaire de*

nation may be totally unsuitable to others. Thus in substance says v. Kühne, and further adds :—

“Notwithstanding some things which at first sight struck us unpleasantly, we were always and everywhere impressed with the conviction that we had before us an ancient and well-disciplined army, inspired by glorious traditions.”

The Cavalry.

Colonel v. Kühne only had the opportunity of seeing two cavalry regiments manœuvre, one against the other, at Bruck. He was very favourably impressed by what he saw, and speaks in high terms of the way in which the regiments were handled under trying circumstances and in difficult ground. They also marched past very well at the trot in columns of divisions.

As with the infantry, trumpet-calls and words of command were reduced to a minimum. The horses were small, compact, and in excellent condition.

Artillery.

The Prussian Colonel had the good fortune to see the inspection of a field artillery regiment by the Emperor.

It was drawn up in line at close intervals, *i.e.*, with 20 paces between divisions, 10 paces between batteries, and 6 paces between guns. Divisions, of which there are 4 in the regiment, consist of 3 batteries, the latter of 4 guns. There were consequently 48 guns on parade, 4-pounders all drawn by 4 horses, 8-pounders by six. The gunners were all seated, three on the limber, two on the gun-carriage. The batteries were well turned out; horses in good condition and well groomed, though rather small.

The movements were well executed, quickly and with great steadiness. The mountain batteries which took part in the manœuvres in Pusterthal are described as having shown on the whole great efficiency, but their effective range and the power of their projectiles (in other

“l'Etranger” on “Le Nouveau Règlement d'Exercices de l'Infanterie Autrichienne” we find the following details :—

Pas habituel de route. Quick step (E).	Number of paces per minute.	Length of pace.	Pas gymnastique (F). Der Trab (Pr). Laufschritt (Au). Double (E).	Number of paces per minute.	Length of pace.
		m.			m.
France	110	0 65	France.....	170	0 80
Germany	112	0 80	Germany.....	165	0 88
Austria.....	115	0 75	Austria.....	155	0 90
Italy.....	120	0 75	Italy.....	170	0 90

N.B.—Length of pace is given in decimals of the mètre.

Reducing the English inch to the decimal of a mètre we arrive at the following :—

England	116	0 76	England	165	0 82
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to it, the 6th is found at Flavigny and the 7th at Vionville; and the only two companies who went straight to the front were so utterly crushed by the overpowering fire that they were driven back, and rallied on the reverse slope of the hill. If such a thing occurred among the Germans, I cannot see why it would not be likely to occur again amongst ourselves.

Next observe what happened at the battle of Beaumont to the 26th Regiment, of three battalions. The regiment had to pass through a not very extensive wood, but when it got to the other side, the three battalions were found split up into two bodies. Sketch No. 3 (Plate XVI, fig. 1) shows the details of one of these bodies. As you may remember, the companies in the German army are composed of three divisions, one of which is the shooting division. The 8th company has lost its shooting division altogether, and the 5th company is doing its work. The 7th has managed to stick together; but the 1st and 2nd shooting divisions have strayed from the main bodies of the 1st and 2nd companies which are in another part of the battle-field. The 3rd, 4th, 9th, and 12th each hold together, but the 11th does not do so, and its shooting division appears here alone.

Let us take another instance, sketch No. 4 (Plate XVI, fig. 2), the storming the Rotherburg on the field of Spicheren. The leading of that battle undoubtedly is open to the gravest and most severe criticism; but the mistakes which occurred, were not due only to the local leaders, but to misunderstandings in the strategical leading which preceded the fight. The advanced portions of two armies are directed upon the same bridge, and the consequence is, that in the course of the action, we find parts of three divisions or of four brigades joining promiscuously in the fight. What was the result? The Rotherburg, which is shown on the sketch, is the point aimed at. It is a very marked feature on the field, and projects beyond the line which was occupied by the French, and unless it was taken, it would take in flank any Prussian troops coming in a southerly direction. It proved a very tough job for the Prussians to get hold of that point; but at 6 o'clock, the fighting having lasted from 12 o'clock, we find a curious collection of companies at this important decisive point. What became of two brigadiers I do not know, but with regard to two others, their brigades were spread along a thin line at the beginning of the day, so that their command was entirely lost. We find 32 companies of two different armies mixed up in utter confusion, with no unity of command whatever, viz., 5 companies of the 74th Regiment, and 4½ companies of the 39th Regiment, belonging to the 27th brigade, 14th division, 7th Army Corps, 1st army; 11 companies of the 40th Regiment belonging to the 32nd brigade, 16th division, 8th Army Corps, 1st army; 8 companies of the 12th Regiment, 10th brigade, and 4 companies of the 48th Regiment, 9th brigade, 5th division, 3rd Army Corps, 2nd army.

Sketch No. 5 (Plate XVI, fig. 3) shows a curious instance of a brigadier losing his brigade. The dotted lines show the distribution of the 28th Brigade, General Von Woyna. When the General arrived on the battle-field he resolved to endeavour to turn the French left flank, and he told

Right wing of 26th Reg. after passing through the Bois de Givodeau

5	7	2	1	4	3	9th.	11th.	12th.	Fig. 1.
8th.	7th.		4th.	3rd.		9th.		12th.	

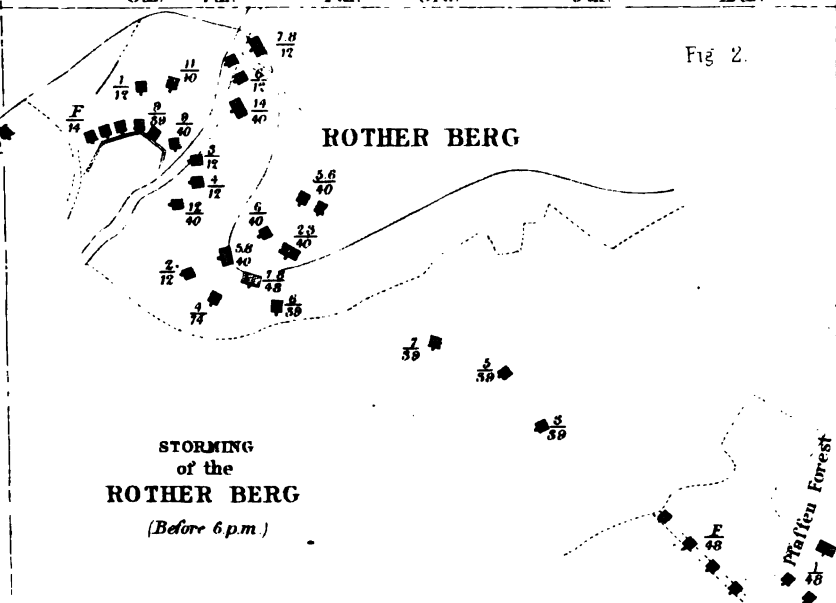


Fig 2.

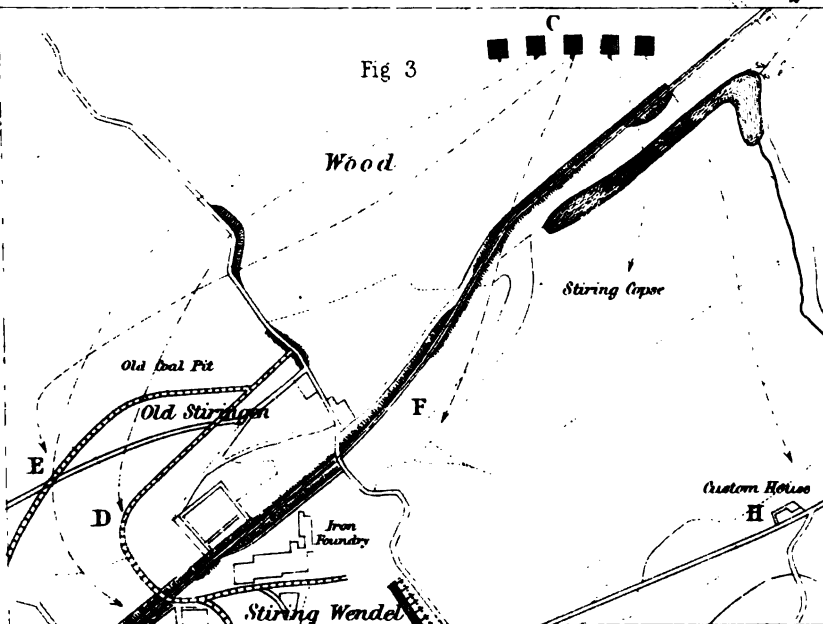


Fig 3

THE MEDICAL DEPARTMENT OF THE GERMAN ARMY IN PEACE AND WAR.

By Surgeon-Major T. W. Fox, R.E.

THE Emperor of Germany, as a proof of his satisfaction with the services rendered by this department during the late war, approved of a new organization of the Medical Corps, under date, 6th February 1873. For information on this subject we are indebted to that valuable publication "*Revue Militaire de l'Étranger*," Nos. 289, 290, which bases its articles on a voluminous work, "*Das Preussische Militär-Medicinal-Wesen in Systematischer Darstellung*," by Dr. Prager, Oberstabsarzt, and also to "*Militair Wochenblatt*," 13th April, 1873, 4th September, 1875.

By these regulations, no medical man can serve as a military surgeon who has not served six months in the ranks (*mit der Waffe*), the young surgeon may then serve for six months more, as a medical volunteer, to complete his one year of obligatory service, provided he can produce certificates from his commanding officer of good conduct, attention to duty, character and intelligence. The medical men among the one-year volunteers¹ are permitted to postpone their year of service until they are twenty-three years of age. They have then the choice of serving one year in the ranks, and for another six months in the ranks as soldiers, and for another six months as military surgeons, under the conditions already stated.

It is requisite, in the first place, in order to appreciate the machinery of mobilisation, to know the data of the problem; on the one hand, the existing resources (the active and auxiliary cadres); on the other, the numbers necessary to raise these to a war-footing.

It is only when these premises are laid down, that the means taken to meet with the resources available, the needs of mobilisation, can be advantageously studied.

I.—THE CADRE OF THE MEDICAL DEPARTMENT IN TIME OF PEACE.

(a.) *Superior Medical Officers.*

Of the eighteen army corps of which the German army is composed since the war of 1870—1871, there are fourteen which are included in the Prussian budget, whereas the 12th and 13th corps (Saxony and Wurtemberg), the two Bavarian corps, and the Brunswick Contingent adhere to their own arrangements.

¹ Germans possessing a certain amount of education, permitted on certain conditions to serve for one year instead of three years with the colours.

The Prussian cadre of the medical department on the peace establishment, according to the warrant published on 25th January, 1872, by the medical department of the Ministry for War is composed as follows :—

1 surgeon-major-general of the army (director-general) ;

16 surgeons-general, of whom 14 are surgeons general of army corps : one is attached to the medical department of the War Office ; one is deputy-director of army medical schools ;

244 principal surgeons for 114 regiments of infantry, 72 regiments of cavalry, 28 regiments of artillery, 19 fortresses of the first class ; 1 for the invalids', 1 for the cadets' school at Berlin, and 2 for the medical department of the War Office.

351 surgeons-major, 228 for infantry battalions, 14 for rifle battalions, 5 for the school of non-commissioned officers.

41 for field-artillery, 14 for pioneers, one for the railway battalion,¹ 1 for the 35th battalion of Landwehr.

21 for fortresses of the 2nd class.

20 for the army medical schools, and 6 for the provincial schools of cadets.

(b.) *Subaltern Surgeons.*

This category of surgeons, which comprises assistant and sub-assistant surgeons, and the one-year medical volunteers, has a strength varying with the number of volunteers, the number amounting usually to nearly 700.

(c.) *Hospital Orderlies (who are to be practically instructed in the Field Hospitals).*

Their number is one per company of infantry or rifles, per battalion of train, per squadron of cavalry, battery of artillery, company of pioneers.

The total strength is therefore not less than 2,500 men on the peace establishment.

(d.) *Hospital Assistants (Dressers).*

Since 1863, the State requires each army corps to instruct in their field hospitals 26 military hospital assistants taken from soldiers of infantry who have completed one year's service, making a total of 377 men for the 14½ army corps which appear in the Prussian budget.

(e.) *Apothecaries.*

The peace establishment includes one principal apothecary attached to the director-general of the medical department, one senior apothecary attached to each surgeon-general of army corps, and about 150 junior apothecaries attached to the hospitals in the proportion of one for a hospital for 2 to 5 battalions, two for one for 6 to 10 battalions, three for one for more than 10 battalions.

Thus, to conclude, the strength of the Medical Corps on a peace footing amounts to—

¹ The conversion of this battalion into a regiment necessitates an augmentation of the cadre of the Medical Corps.

- 1 director-general (médecin-major-general).
- 16 surgeons-general.
- 244 principal surgeons.
- 351 surgeons-major.
- 700 junior surgeons (médecins subalternes), including sub-assistant-surgeons and the one-year surgeon-volunteers.
- 165 apothecaries.
- 2,500 hospital orderlies.
- 546 hospital assistants.

II.—STRENGTH OF THE MEDICAL CORPS ON A WAR FOOTING.

(a). *Superior Surgeons.*

On the subject of the effective strength of superior (or senior) surgeons required for mobilization, or in war time, a few general data only can be given. It is evident that the normal peace establishment is insufficient for the needs of war. This normal strength is so much more insufficient, since in time of peace the framework, basis, or "cadre" of every kind of formation required in war time is not kept up, such as chief or principal medical officer at head-quarters of the army, principal medical officers of army corps, surgeons-general of military routes (étapes), surgeons consultant-general, surgeons of divisions, directors of field hospitals of army corps, surgeons of camp hospitals, of home hospitals (de l'intérieur), surgeons of sanitary detachments, &c.

It is requisite, therefore, to have recourse for field services to the surgeons of the Beurlaubtenstand,¹ even to the military surgeons on retired pay, or to those still available for service (à la disposition), and also to civil surgeons not liable for military service.

Counting the figures necessary for a single army corps, without reckoning superior appointments, the requirements are as follows :

2 surgeons-general, 1 for service in the field (mobilisé), 1 for home service (territorial).

2 divisional surgeons.

The director of the hospitals of the army corps.

Principal surgeons of 12 field hospitals.

6 surgeons-major of sanitary detachments.

Surgeons-major of the personal reserve.

Principal surgeons of established war hospitals.

Surgeons-major of military étape (routes), and of commissions of transfer.

Senior surgeons of the troops, mobilized in the same number as those assigned to corps by the peace-establishment, except the principal surgeon of a divisional regiment of artillery, and the surgeon-major of a battalion of pioneers, both of whom become available for other duties by the breaking up of their corps, in consequence of mobilization.

¹ The Beurlaubtenstand is composed mainly of men who have served with the colours, and are in the reserve or Landwehr, from the fourth to the twelfth year of service inclusive.

Surgeons-major of battalions, and for replacing casualties (reinforcement).

Chief surgeons of fortress.

Surgeons of schools of cadets and of other military establishments.

Principal and practising surgeons, i.e., the chief surgeon and those in charge of the patients in the hospitals at home.

Surgeons-major of garrison troops and of corps of "Landwehr."

(b.) *Subaltern Surgeons.*

The numbers of assistant-surgeons required on a war-footing are—

1 assistant-surgeon attached to the surgeon-in-chief of the army; to each surgeon-general of army corps, or of "étappe;" to each battalion of infantry and rifles; company of pioneers; bridge train; company of construction of railways; section of field-telegraph; to the staff of each division of ammunition-columns and auxiliary-supply columns; each battalion of foot-artillery, including the Landwehr; dépôt battalion of infantry; dépôt company of rifles and of pioneers; dépôt division of artillery; of the railway battalion of military train; and each commandant of the line.

2 junior surgeons to each regiment of cavalry of the line, of Landwehr, or of garrison, to columns of ammunition of each army corps, to each group of 100 patients in the hospitals at home.

3 junior surgeons to the staff of each battalion of train mobilized, to each field hospital.

4 junior surgeons to the staff of each of the 2 of the field-artillery regiments of each army corps.

5 junior surgeons to each sanitary detachment.

9 junior surgeons to the hospital reserve of each corps.

(c.) *Hospital Orderlies.*

Up to the year 1869, the number of hospital orderlies required by an army corps on a war-footing amounted at first to 316, subsequently to 350. In 1869, the number was raised to 441 or 511 for army corps, according to their effective strength; about 6,148 for the Northern Confederation. At the present time, this number would be insufficient, and the strength must be calculated so as to allow—

1 hospital orderly for each company, squadron, battery, or ammunition column of the army in the field, and the troops of reserve, relief, or of garrisons; for each surgeon-general of corps; director of hospitals; consulting surgeon; divisional surgeons; also for each construction company, or each railway field division.

2 hospital orderlies for each surgeon-in-chief, and for the division of the dépôt of the railway battalion.

3 hospital orderlies for the division detachment of relief of the train battalion.

4 hospital orderlies for the surgeon-in-chief of the army, and for each reserve dépôt of hospitals.

8 hospital orderlies for each sanitary detachment.

9 hospital orderlies for each field hospital.

27 hospital orderlies for a hospital reserve of each army corps.

Lastly, in the hospitals at home, 3 hospital orderlies for each group of 100 patients.

(d.) *Hospital Assistants.*

For the troops immediately mobilized, the following are required by each army corps :—

204 hospital assistants (dressers), 24 for the 3 sanitary detachments, 144 for 12 hospitals, 36 for the hospital reserve. For the home hospitals must be reckoned in addition 6 dressers for each 100 patients.

(e.) *Apothecaries.*

The numbers required for each army corps are thus laid down—
2 senior apothecaries (one for field, one for home service).

19 field apothecaries attached to the three sanitary detachments, to 12 field hospitals, to the hospital reserves' depôt, in the proportion of 1 for each establishment, but 2 in the hospital reserve.

Moreover, each home hospital receives 1 apothecary for each group of 400 patients.

To give an idea of the numbers required for the mobilization of the medical corps of the Northern Confederation (12½ corps) in 1870—71).

1. *Part of the Army immediately Mobilized.*

4 surgeons-general (surgeons-general of the active army).

24 surgeons-general (7 surgeons-general and 17 principal surgeons of the active army).

32 divisional surgeons (principal surgeons of the active army).

13 directors of hospitals (12 principal surgeons from the active list and 1 recalled from the reserve).

152 chief surgeons of field hospitals (105 principal surgeons and 45 surgeons-major on the active list, 2 surgeons-major of Beurlaubtenstand).

568 surgeons-major (94 surgeons-major, 58 assistant-surgeons from the active list, 163 surgeons-major, and 222 assistant-surgeons from the reserve Beurlaubtenstand).

2 surgeons-major and 12 assistant-surgeons from surgeons not liable for military service, 17 vacancies).

1,587 subaltern surgeons (311 assistant and sub-assistant, and 202 one-year volunteers from the active list), 619 assistant-surgeons and sub-assistants from the Beurlaubtenstand, of which 12 had served in the ranks (mit der Waffe); 31 reservists of the ersatz reserve; 20 assistant surgeons and sub-assistants not liable for service.

58 pupils of the medical corps, 330 medical students who have passed their seventh half-year of study, of whom 8 are not liable for service, 16 vacancies.

11 consulting-surgeons (1 surgeon-general on the active list, 5 surgeons-general of Beurlaubtenstand, 5 surgeons not liable for service).

72 practising surgeons, of whom 52 are not liable for service; 20 foreigners.

152 assistant-surgeons, 52 not liable for service; 18 students of 7 or 8 half-years' standing; 57 foreigners.

2. *Part of the Army subsequently Mobilized.*

12 surgeons-general (3 general, 7 principal surgeons on the active list, 1 general, 1 principal surgeon recalled).

30 principal surgeons (17 principal surgeons, 6 surgeons-major on the active list, 1 surgeon-major of Beurlaubtenstand, 1 surgeon-general, 5 principal surgeons recalled).

391 surgeons-major (14 surgeons-major and 9 assistant-surgeons on the active list, 44 surgeons-major, and 145 assistant-surgeons of Beurlaubtenstand, 17 surgeons-major, and 8 assistant-surgeons recalled to the active list, 16 assistant-surgeons not liable for service, 138 vacancies).

610 subaltern surgeons (16 assistant-surgeons and sub-assistants, and 36 one-year volunteers of the active service, 106 assistant-surgeons of the Beurlaubtenstand, of whom two had served in the ranks and 41 came from the Ersatz Reserve,¹ 4 assistant-surgeons recalled to the active list, 4 not liable for service, 2 medical corps students, 409 surgeons liable to service, 18 surgeons of the Ersatz Reserve, 7 surgeons not liable for service, 1 vacancy).

8 consulting surgeons (not liable for service).

Reckoning up the totals, it is evident that, without counting the *personnel* of the voluntary assistance, the mobilization of the 12½ army corps of the Northern Confederation required not less than 3,851 surgeons, in the following category:—

1,156	surgeons on the active list;
1,363	„ of Beurlaubtenstand;
241	„ not liable for service;
842	„ who have not yet obtained a diploma;
77	„ foreigners;
172	appointments vacant.

In this enormous list of 3,851 military and auxiliary surgeons are not included the 1,769 surgeons engaged under contract to do duty in the military hospitals at home.

As to the non-medical *personnel*, always excepting the agents of societies in aid of the sick and wounded, the following are the figures:—

1,376	employés;
577	apothecaries;
5,286	hospital orderlies;
10,576	„ assistants (dressers);
13,017	train soldiers, including carriers of wounded (kran- kenträger or brancardiers);
30	surgical instrument makers;
170	surgery boys;
743	cooks.

Total 31,775 persons.

¹ The Ersatz Reserve.

3. *The Mobilization.*

It remains now to ascertain in what manner the military authorities, with the means at their command succeed in placing on a war-footing at the proper time, all the combinations in which each of the constituent elements of these large numbers takes its place. Dr. Prager, in his book on the Prussian army, Medical Department, thus writes :—

“ On account of the great want of surgeons and the absolute necessity of providing at once for the needs of the part of the army to be immediately mobilized, there is no other resource at the first moment than to take some or all of the military surgeons from the troops still non-mobilized (immobile), especially from garrison troops, dépôt-battalions, and corps of Landwehr. To provide for the medical duties with these troops, arrangements are made in the different garrisons with the civil surgeons who from age are no longer liable for military service. These surgeons receive a remuneration in proportion to the services required of them.

“ The contract is made with those interested, and the remuneration fixed by the Intendance Department of the province (Provincial Intendantur), in accordance with the conditions of the surgeon-in-chief of the territorial army.

“ The allotment of the persons to their different employments at the time of mobilization was formerly the duty of the Medical-Director-General; but experience soon proved that such a duty was beyond his power to carry out. It was then laid down that in each army corps the surgeon-general should allot all the available persons. The surgeon-general, as soon as the mobilization is ordered, draws up his plan of distribution of duties with the least possible delay, and submits it to the medical department of the Minister of War.

“ There the distribution is examined and approved, or, if need be, modified.

“ In the plan of distribution, any numbers which may be in excess, may be transferred, so as to allow the Director-General to meet any deficiencies which may exist in other army corps.

“ As the Guards have no surgeons of *Beurlaubtenstand*, this army corps must, in the same manner, draw upon the resources of other corps.

“ To place the surgeon-general in a position to complete the distribution returns without delay, commandants of brigades are ordered to furnish each year to the general commanding the army corps, a nominal roll of civil surgeons belonging to the Reserve, the Landwehr, and the *Ersatz Reserve*¹ troops of the first and second class.

“ These lists, furnished to the surgeon-general, enable him to regulate and complete his own lists.

“ Moreover at the time of mobilization, the civil authorities send to the surgeons-general ‘states’ of all the medical men residing within their districts.

¹ The *Ersatz Reserve* includes the one-year volunteers and the men who, though in the annual contingent, are not required to serve with the colours.

"As regards apothecaries, hospital assistants, and orderlies of the Beurlaubtenstand, the surgeons-general receive annually from the Landwehr battalions nominal lists by which they can at all times control the movements of men of these classes in the different districts of the Landwehr battalions. By the aid of these documents, the surgeons-general establish each year numerical 'states' of all the surgeons, hospital orderlies, &c., of the line or the Beurlaubtenstand, and forward these 'states' in the month of March to the medical-director-general.

"With the object of simplifying mobilization, it has been ordered to carry out in advance annually in the various army corps the scheme of distribution of the surgeons of the active service, of the Reserve, the Landwehr, and Ersatz Reserve. To facilitate this arrangement, it is requisite every year that the compensation transfers, which are decided upon by the surgeon-in-chief of the army, should be carried out on paper by names, or at all events by numbers, and should be made known to the Generals commanding the respective army corps.

"Furnished with this information, the surgeon-general can easily complete a nominal distribution return of the officers of the medical department."

As to the Guards, the surgeon-in-chief establishes, by means of a numerical strength in excess of other corps, a nominal distribution scheme, and brings it to the notice not only of the surgeon-general of the Guards, but also, as far as it may concern them, of surgeons-general of army corps which are to supply surgeons needed to the Guards.

Finally, to save loss of time, from the moment of mobilization, or during the course of a campaign, the surgeon-in-chief is authorised, during the time the army remains mobilized, to dispose of all military surgeons without distinction of army corps up to the rank of principal surgeon, inclusive, without restriction, and according to the exigencies of the service, with the single condition of reporting such transfers to the War Department.

In the carrying out of the distribution, every latitude is left to surgeons-general, who are required to know the capabilities of all military surgeons, and to make themselves acquainted with those of the surgeons of the Beurlaubtenstand. The following regulations must, however, be followed:—

The most able physicians and the most clever operators are to be reserved for the field hospitals.

For duty with sanitary detachments, preference should be given to those surgeons who, in addition to professional ability, possess great vigour and activity of mind and body. The hospitals are to receive as junior surgeons, and as surgeons in charge of patients, a certain proportion of surgeons of Beurlaubtenstand. The sub-assistants and the one-year volunteers will, as a general rule, not be attached to these hospitals.

After the field hospitals and the sanitary detachments have been provided for, the remainder of the medical officers are to be distributed, according to their seniority and ability, among the different appointments of surgeon-major and assistant-surgeons of corps. Almost all

the principal surgeons of regiments are placed at the head of field hospitals.

The surgeons-general of army corps are always provided with printed forms of summons and of letters of service.

Such are the principal arrangements which regulate the mobilization of the medical corps.

The entire resources of the active army and of the *Beurlaubtenstand* are quite inadequate to meet the requirements of the army in the field, as we have seen above. For that army, recourse must in addition be had to the pupils of the medical corps and to two non-military elements—qualified surgeons not liable for military service, and medical students advanced in their studies. As regards these latter, the conditions of their employment laid down in 1870 are as follows:—

1. All medical students who have reached, at least, the seventh half-year of study, and are liable for military service, will during the present period of mobilization be excused from serving in the ranks, on condition of completing their military service by serving in the medical corps from the time of receiving their first summons from the medical-director-general.

2. These surgeons will be made known to the medical-director-general by the recruiting authorities. The military documents and students' certificates which concern them will be attached to this notification.

3. When the surgeons have been already summoned to serve in the ranks, the documents referred to above will be forwarded by their corps.

4. Control of Surgeons of the Beurlaubtenstand.

In time of peace the surgeons of the *Beurlaubtenstand* include:—

1. Surgeons who have fulfilled their military obligations in the medical corps and have been discharged as surgeons of *Beurlaubtenstand*.

2. Surgeons who have fulfilled their military obligations by serving in the ranks, and have been subsequently admitted on their own request to enter the *Beurlaubtenstand* of the medical corps.

3. Those who, belonging to the *Ersatz Reserve* have not served in time of peace, but have been called upon for active service, and after three months' medical service have passed into the Reserve or the *Landwehr* of the medical corps.

4. Those who, having completed the time of service, have been returned to be disposed of by the recruiting authorities, and have after six months' service succeeded in passing into the medical corps.

5. Those who, after serving six months in the ranks, and on condition of having to complete the rest of their active service, have been classed in the reserve of the medical corps, and invested, in case of mobilization and subject to the condition of having completed the sixth half-year of their studies, with the rank of sub-assistant-surgeon.

6. Those who in former wars have served as sub-assistants, and having obtained their diplomas, have been admitted into the *Beurlaubtenstand* of the medical corps.

The complete detailed and constant control of these different classes,

and precise information as to the surgeons of the *Beurlaubtenstand*, also as to those not liable for service in the *Ersatz Reserve*, are under the surgeons-general. This knowledge alone makes it possible for them to make an exact estimate of the *personnel* placed at their disposal in case of mobilization, to utilise this strength according to the seniority and ability of each, and to establish the plan of a regulated distribution each year, as well as the plan of distribution, which at the decisive moment they must forward, without further orders, to the medical-director-general. But in order that the surgeons-general be kept constantly informed, it is necessary that the Officers commanding districts of *Landwehr* pay constant attention to the *personnel* or list of surgeons, that they keep the surgeons-general constantly and immediately informed of all changes that occur—of surgeons newly established, change of residence, death, transfer into the active service, emigration, liberation from the service, &c.

On the other hand, Surgeons-general, Commandants of Corps and of *Landwehr*-districts, must each time that a surgeon quits the army corps, the various corps, or the district, report to the district commandant of *Landwehr* where the surgeon is about to establish himself.

It is not the less necessary that the rolls should be kept with the greatest care, as well in the offices of the surgeons-general as in those of the *Landwehr* authorities, and that surgeons-general should receive all reports addressed to the authorities of the command in everything which concerns the Officers and troops of the *Beurlaubtenstand*, also the nominal rolls of surgeons on the rolls of the commands of the *Landwehr*-districts, who do not form part of the medical corps rolls, which are opened each year and closed in the month of December. It is also necessary that the surgeon-general examine carefully the nominal rolls of surgeons of the *Reserve*, of the *Landwehr*, and of the *Ersatz Reserve*. These lists are forwarded every year to the commanding Officers of the army corps by the Officers commanding infantry brigades. There the different rolls are carefully compared with those in their own office, and in the event of discrepancies, inquiries are made or the necessary measures taken.

The control of the apothecaries of the *Beurlaubtenstand* is held by the commandants of *Landwehr*-districts, before whom the apothecaries must present themselves every time that the regulations in force require it, with the same punctuality as the surgeons.

On the other hand, the surgeons-general receive (1) every month from the *Landwehr* commands, a return showing the casualties which have occurred in their *personnel*; (2) every year from brigade commands a nominal list of the apothecaries borne upon the rolls of the *Reserve* and of the *Landwehr*.

Lastly, the surgeons-general cause a list to be prepared by the apothecary-in-chief of their numbers, and forward annually to the medical-director-general a numerical return and a nominal roll.

As regards the hospital orderlies, they receive from their regiments at the time they leave the active service, the "military pass" and a certificate of good conduct, and are, like other soldiers, sent back by their corps to the authorities of the *Landwehr*. They are entered in

the rolls of the Landwehr authorities on the one hand, and of the surgeons-general on the other. The two rolls are made out by reciprocal communication of monthly reports of casualties, and of annual nominal rolls. The hospital orderlies appear in the distribution laid down each year by the director-general and at the time of mobilization.

In the latter case the hospital orderlies are sent by the district command to the train battalion, and there, according to the distribution return, are allotted to sanitary detachments, field hospitals, &c.

Such is the outline of the means of mobilization of the medical department in Prussia. The surgeon-general of an army corps is the prime mover of the machine. It is necessary, however, to remember that the mobilization of surgeons, apothecaries, and hospital orderlies is only a part, and that the most easy, of the difficult task of all the medical field arrangements of army corps.

The most difficult part is the mobilization of the sick-bearers, the train-men and teamsters, the means of transport, and of all the materials required for a battalion or for a train dépôt.

We must add that the "Intendance," or control department has also to take part in this arrangement, placing at the disposal of the medical department in the field the men required for these purposes.¹

From No. 299, "Revue Militaire," we have also abstracted the following interesting *résumé* of the organization of the medical service in the principal Continental Armies.

I. The medical service in all the Armies of Europe is self-governed, that is to say, it forms a service distinct from all others, and directly subordinate to the chief military authority.

In the German Army, this autonomy of the medical service has so long been regarded as a matter of course, that it is impossible in the voluminous collection of warrants, War Office orders, and regulations which govern the medical department, to find a single sentence clearly affirming this fact.

The "Intendance," which, from a French point of view, can alone be intermediate between the military authorities and the medical service, has no other connection with that service than with other corps and services non-administrative.

In the Italian Army, where the *intendance*, such as we understand it, has no existence, and where the commissariat corps, which in part corresponds to it, is a corps acting side by side with the medical corps but not above it, the medical service regains its own independence (right of self-government) under the command of the military authorities. It is the same in Switzerland. If, on active service, a part of the Italian medical service, the field hospitals, are placed under the orders of what is termed in Italy the "Intendance of the Army," it is because this *intendance*, far from being analogous to that which is so called in the French Army, is merely a part of the military command.

¹ See "Militair Wochenblatt," 13th April, 1872, and "Revue Militaire d l'Etranger," 16th April, 1872, and 11th and 18th March, 1876.

From many points of view, and especially in all its relations with the medical service, the intendance of the Italian Army is no other than the Prussian department of inspectors-general of military communications ("inspection générale des étapes"). It would then be a strange misconception of terms, to conclude from this arrangement, that the medical department in Italy was subordinate to the intendance.

In Austria, as in Italy, the medical department is not subordinate to the "intendance." If on service, the second line of the medical establishments and their medical director are placed under the orders of the "Intendant of the Army." It is to be observed that the latter is, as in Italy, a general officer, and that his authority is not simply administrative, since, in addition to his administrative staff, he has a military staff. This subordination to military authority represented by a general Officer invested with the full powers of an intendant of the Army, is direct.¹

Those of our readers who remember our remarks on the medical services of the Russian and Spanish Armies, know that this department is in those countries absolutely independent of every administrative service and is placed under direct military command.

II. In all European Armies the control of the medical department is in the hands of the military surgeons.

Let us proceed to examine, in detail, how this control is exercised.

1. In the peace and war establishments.
2. In army corps.
3. At the central administration.

1. *Establishments.*

The Prussian Army. The control of the peace-hospitals is left absolutely and without restriction in the hands of the surgeons-in-chief: the peace hospitals are declared officially by the Cabinet Order of 24th October, 1872, to be placed under the control of the chief surgeons. The surgeon-in-chief holds the command of the hospital, he is chief of all the *personnel*, military, medical, and administrative, employed for the service of the hospital. The administration (which is conducted by a Committee, of paymaster and steward) is subordinate to his direction and control. As to the intendance, which once took part in the administrative control, its duties are limited to the verification of accounts and the ordering of credits. It still intervenes to direct, in concert with the surgeon-in-chief, the distribution of the different branches of the administrative services among the various persons employed at each establishment.

The arrangements applicable to peace-hospitals are equally so to field-hospitals.

This principle is not neglected except as regards sanitary detachments (ambulances of the first line), where an Officer being placed at the head of the company of carriers of the wounded attached to the

¹ The head of the Medical Department near the Intendance of the army is responsible to the Intendant in all matters concerning the medical service under his immediate orders.

ambulance, it is naturally to this Officer, and not to the chief surgeon, that military commanders refer, under the general direction of the surgeon of the division or army corps.

Italian Army. "The control of each hospital belongs to the surgeon of the highest rank among those attached to the hospital. The board of administration of each hospital will be composed of: the surgeon director, president; the two next senior surgeons, members; an officer of the pay department reporter; and secretary." (Decree of 23 November, 1872, Article IV.)

Austrian Army. In addition to the control of the medical service, properly so-called, the senior medical officer takes at the same time the title and duties of director (Leiter) of administration and management. He is president of a board of management, composed also of the commanding officer of the "troupe de Santé," and of an accountant.

Russian Army. The greater portion of the hospital establishments of the Russian Army are the regimental hospitals placed under the authority of the chiefs of their respective corps. General hospitals and militia hospitals are placed, in all that concerns their military aspect, under the orders of the Commandant of Militia (*des troupes sédentaires*), for medical and administrative purposes under the direction of the chief surgeon, president of the board of administration.

Spanish Army. The control exercised by the surgeon-in-chief is absolute, as in Prussia.

2. *General Commands, Army Corps, Divisions.*

All the Military Powers have established near the chief of the great strategic unit—army corps, general command, or division—a director of the medical department, whose duty it is to centralize within the limits of this unit, everything which concerns the medical corps and service.

The duties of surgeon-general of a Prussian army corps include—the *personnel* of surgeons, apothecaries, hospital orderlies and dressers, all medical, surgical, and pharmaceutical stores, hygiene, sanitary police, medical statistics, the recruiting and mobilization of the medical corps. A recent article in the "Revue," has given elsewhere, circumstantial details of the duties of a medical director of an army corps. We may add that an Order in Council of the 6th February, 1873, lays down, for the Prussian Army, the creation of the appointment of surgeons of division, intended to form a new grade between the local authorities represented by the chief surgeons of hospitals and the authorities of the province represented by the surgeon-general of army corps.

In Italy, the decree of the 17th November, 1872, defines the duties of principal surgeons of divisions—the organization of the Italian Army in time of peace corresponds, as is well known, with territorial divisions and not with army corps districts. This decree lays down orders that:

"The appointment of director of military hospitals, instituted by the decree of the 13th November, 1870, in each territorial division,

"shall be given to a medical director, nominated for that employment by decree.

"The medical director of the military hospitals of a division, already responsible for the professional control of the medical service in the hospitals, shall have, in addition to these duties, the control of administration and of discipline. He will be, in point of fact, entrusted with the authority of chief of a corps, in all that concerns the *personnel* as well as the supplies and the management.

"Each divisional direction of hospitals will be administered, carried into effect, by a permanent Committee, of which the medical director will be president; the two next senior military surgeons, members; the pay officer, director of the accounts; reporter; and secretary."

The hospitals and ambulances are subordinate to the divisional command (territorial or mobilized) as a detachment depends on the unit which furnishes it.

In the Austro-Hungarian Empire, in Russia, and in Spain, the surgeons-in-chief of military commands, of territorial circles, of conscription, &c., fulfil under the sole authority of the general commanding, functions analogous in all points to those of surgeons-general of Prussian army corps.

3. Central Administration.

Prussian Army. The dualism, which, before the reforms of 1868 completed in 1872 and 1873, was the characteristic of the German medical service, and which placed, on the one hand, the professional portion (*personnel* and *matériel*, medical, surgical, pharmaceutical, and auxiliary) at the office of the medical director-general, and on the other hand, the purely administrative portion, at the department of military administration, this dualism was suppressed by the creation, at the War Office, of a military medical division (Army medical department) at the head of which was placed the surgeon-in-chief of the Army.

By the terms of the Order in Council of 28th September, 1868, the duties of the Army medical department include:

1. Hygiene, sanitary police, and medical statistics.
2. Final decision of medical questions of recruiting and of discharge from the service.
3. The supply of the Army with medical stores, surgical instruments, and materials.
4. The management of hospitals in peace and war.
5. The *personnel* and the schools for military surgeons, apothecaries, hospital orderlies, and assistants.

In Bavaria, the organization of the military medical department at the War Office is the same.

The Spanish Army has an almost exact copy of the same organization.

In the Austro-Hungarian Army, the dualism, which we remarked above was once the characteristic of the German service, still exists, only the two leading divisions, on which depend all the branches of the medical service, are both under the control of a military surgeon,

One of these divisions is the medical board, of which the president is the director-general of the medical department, and which is entrusted with the hygiene and sanitary police of the Army, also with the medical machinery of recruiting and of invaliding. The second of these divisions, which constitutes the 14th division or department of the War Ministry, the military medical division, is responsible for the hospital service.

In the Russian Army, the medical service is conducted by a special central administration, it bears the number nine, and comes immediately after the administration of engineers. Presided over by a medical inspector-general of the Army, it comprises, independently of a scientific committee and office of administration, the four following sections:

1. Hygiene, sanitary police, and legal medicine.
2. The *personnel* of surgeons, veterinary surgeons, apothecaries, and hospital dressers.
3. Stores, medical, surgical, and pharmaceutical.
4. Accounts and records of expenditure of stores.

All that concerns the *personnel*, the establishments, furniture, and working stock, is controlled by the hospital committee, consisting, under the presidency of the chief of the general staff, of three members, who are: the chief of the central direction of the medical service, the deputy chief of the central direction of engineers, and the intendant-general.

The Italian Medical Board is formed on the model of that of the Austrian Army. Independently of its professional duties (hygiene, military, and legal medicine), it is invested with the control of the officers and men of the medical corps, and centralizes the divisional medical service.

In conclusion, in all the great Continental Armies, all the component parts which form the medical service of the Army are arranged in one corps, distinct non-administrative service, independent of other corps, arms, or services of the army, and placed immediately under military authority.

In all armies and in the different details steps which form the general organization of armies, from the hospital up to the medical division or section of the central administration, the control of the medical service is in the hands of the military surgeons.

THE MILITARY RESOURCES OF HOLLAND.

By C. E. HOWARD VINCENT, F.R.G.S., Lieut.-Colonel Central London Rifle Rangers; of the Inner Temple, Barrister-at-Law, late 23rd Fusiliers.

THE Dutch are a quiet, industrious people, occupying themselves but little with the disagreements of their neighbours, and seldom asserting themselves upon international questions. But they occupy wherewithal a territory, which, at the same time that it is for our interest they should continue to hold, possesses such a seaboard and such maritime resources, as cannot fail to excite the envy of any power desirous of developing its naval strength. Small kingdoms lying at the gates of mighty sovereigns, need be watchful lest their lack of foresight should jeopardise their very existence. From time immemorial, the inhabitants of the Netherlands have, upon necessity, proved themselves patriotic and courageous. These, however, are days when mere patriotism and courage avail but little unallied with preparation and organization. The former moral qualities the Dutch still incontestably possess. How they stand as regards the latter necessities for defence, I here propose to show.

The forces of Holland are composed of:—

- (a.) The standing Army.
- (b.) The militia.
- (c.) The schutters (protectors).
- (d.) The landsturm.

The standing Army is recruited by the voluntary enlistment of men from the early age of 16 to the mature state of 40. The first engagement is for six years, after which men can bind themselves afresh for one, two, or six years. It is strange to find a foreign country furnishing its Army in a manner so similar to ourselves. Nor is it possible to deny that the Dutch are no less dissatisfied than ourselves with this voluntary system. For them the question at stake is of a more serious character. We have three score miles or so of treacherous ocean betwixt ourselves and an invader; they, naught but an artificially-marked frontier line. True, the dykes, which in peace keep at bay the intruding waters, may be cut through and the impatient flood suffered to come in, but the result, though inconvenient to the enemy, overwhelms the country with ruin, destroys towns and villages, overthrows castles and cabins, nullifies the industry, the labour of years, and presents a terrible picture of human suffering.

The attractions of a civil career, the emoluments attainable by skilled labour in less irksome paths, render the recruiting slow and difficult. Re-engagements are rare, even amid the non-commissioned officers, who can thereby obtain a bounty of 600 guildens. Nevertheless, it is stated, and no doubt correctly, that the Army numbers in peace some 30,000 men, and in war 61,000. This large increase is obtained by the accession to the standing Army of the militia, which forms its reserve.

The militia is likewise recruited, as far as possible, voluntarily, but its numerical deficiencies are repaired by conscription. The period of service extends over five years, whereof the first year is continuous, and the remaining four are subject to an annual inspection and one training of five or six weeks. As of late the standing Army has been considerably below its strength, it is in contemplation to extend the first training from one to two years. At present some 11,000 militiamen are assembled each year, but it is proposed to increase this number to 13,000, and to allot 1,000 thereof to the naval militia.

The Dutch infantry consists of 9 regiments, each of 4 battalions with 2 *dépôt* companies, armed with the Beaumont breechloader.

Each company numbers 3 Officers and 188 men.

The cavalry consists of 4 regiments of 6 squadrons, whereof one is in reserve and another forms the *dépôt*. The field squadron is composed of 5 Officers, 202 men, and 126 horses.

The artillery consists of 1 regiment of 14 field batteries, and 1 regiment of 4 horse batteries.

In addition to these forces, there is an Engineer corps, with 70 Officers and 40 artificers; and 5 companies of sappers and miners.

The whole of the above form the field Army, which is divided into four Divisions. Their military value is not perhaps particularly strong, but they possess one cardinal quality in the allotment of all the commands, and in the exact composition of the several divisions.

We may now turn to the Schutters or protectors of Holland. They are intended for the defence of the soil and the preservation of internal order. Every Dutchman not serving in either the standing Army, the Navy, or the militia, is supposed to belong to the schutters from the twenty-fifth to the thirty-fifth year of his age. But as the schutters can only be two per cent. of the entire population, the candidates are selected by lot. The ten years' liability is divided into two equal periods, of which for the latter the schutter belongs to the reserve. The active schutterry, consisting of the twenty-five to thirty-year old men, is divided into 220 companies, of from 110 to 150 men. Twenty-five of these companies are instructed in big gun practice. The reserve schutterry numbers 89 battalions, with a total strength of some 40,000 men, armed with the Snider.

The last unit of the Dutch defensive force—the Landsturm—includes all males from nineteen to fifty years old, but, as is usual, its organization is deferred to the moment of necessity.

As to the Officers, after a two years' course—about to be extended to three at the Military Academy—those Officers destined for the cavalry and infantry are appointed to regiments. Those wishing to

enter the engineers or artillery, having successfully passed the ordinary examination, remain for an additional twelvemonth at the school. Last year also a Staff College was established at Breda; but, as the entire staff corps numbers but 20 Officers, it is not expected that very many will avail themselves of the College on such a very meagre chance of employment.

Such are the military resources of Holland. We confess that they are not on so satisfactory a basis as might be desired. Although the most is made of an inferior system, it may well be doubted whether, even in such a limited area, the Army could be mobilised within the forty-eight hours that sanguine Dutchmen anticipate. Sufficient allowance is not, we venture to think, made for the variety of elements which compose the military forces. Insufficient account is taken of the deficiency of Officers and good non-commissioned officers in the militia and in the schuttery, not to say in the regular Army. It is idle to conceal it, the Dutch are not a soldier people and the Army is not popular. It partakes singularly little of a national character. In those branches recruited in part by conscription, substitutes are obtainable for a very small sum, and they consist almost wholly of inferior individuals, taken from the poorest classes. Universal service is an absolute necessity for Holland, and the sooner it is adopted, the more secure will the country be.

Not a few will recognise, even in this glimpse of the forces of the House of Orange, a system, as regards many particulars, which some of our insular reformers would feign import. Such is especially the case with respect to the Dutch East Indian Army. It is entirely distinct from the Home Army, and is formed of Europeans, mercenaries, and natives. The total force numbers 1,476 Officers, of whom 67 are non-Dutch Europeans, and 29,194 men, with 1,379 horses. The infantry are armed with the Beaumont rifle, and the artillery provided with breechloading rifled guns.

I will not go so far as to say that this system is radically bad; but the heterogeneous nationalities and the inferior Officers of the Dutch Indian Army must detract considerably from its value.

THE NEW FRENCH INFANTRY TACTICS.

By a decree dated 12th June, 1875, a new system of Infantry drill was substituted in the French army for the regulations then in force, and which date from the 16th March, 1869.

To a Commission of Officers presided over by General Blot, of the Staff of the Minister of War, was entrusted the duty of bringing the Regulations of 1869 into conformity with the requirements of warfare evidenced by the campaign of 1870-71. The Commission disclaim any revolutionary inclination in dealing with the question, but whilst acting as far as possible in a conservative spirit, they seem to have accepted in their entirety the conditions of the combat in which the rifled gun and the breech-loading small arm are the weapons employed.

The report of the Commission is placed in the drill-book as an introduction to its contents, an excellent and praiseworthy measure, as such prominence is thereby given to the spirit which animates the new system, that it will be difficult for any French soldier to follow out henceforth that system only in the letter. It is purposed to give in this article an outline of the new system and of the grounds on which it is based.

As a matter of course increased importance is assigned to the company, but the reasoning by which this alteration is supported and justified, is so peculiar that it must be given *in extenso*.

"It is evident that in the combat in extended order, the battalion in first line, which as has just been admitted must be broken up, can no longer be commanded directly and by word of mouth of its commander, as should be the case with all bodies of troops in immediate contact with the enemy.

"In the company, this mode of command will still be possible for the captain; we are therefore led to regard the company as the real fighting unit (*unité de combat*).

"But the company is too weak to carry on an action by itself; its strength is not sufficient to allow it to act independently; the battalion, on the other hand, unites all the conditions indispensable to carry through an enterprise to a successful conclusion; moreover, it is to the battalion, not to the company, that under any circumstances orders will be given from superior authority. It is then the duty of the commanding officer of the battalion to exercise a general control over his four fighting units, and to cause them to work together to a common end. The battalion is always the centre of action; it is a

"body, of which the companies, the fighting units, are the arms. It follows that it remains the tactical unit."

It is to be hoped that in their efforts to learn from their late antagonists in organization and tactics, the French have not grasped at the shadow instead of the substance. If the French want to find the unit commanded on the field of battle by word of mouth, they must search far below the company; but, assuredly, no reason of this kind influenced the Germans when they assigned a certain amount of independence and a great share of responsibility to the leader of 250 men.

The Commission is more successful in dealing with the means by which order is to be maintained under the antagonistic influences of undivided action and of formations in which "touch" is no longer preserved:—"The inconveniences arising from the new system of tactics will be avoided if the fighting in extended order be carefully regulated, and if troops are practised during peace under circumstances resembling as closely as possible those met with in war, so that by the use of a simple formation always and everywhere practicable, this order soon becomes familiar to them;" and recognizing the vital importance of decentralization in drill as well as in administration, the report continues:—"For the same object the cohesion in each fraction must be maintained by every available means; commanders of all ranks must, in assuming the initiative, learn to judge accurately the amount of responsibility which rests on them; and finally the intellectual and moral power of each officer and soldier will be increased by a more complete and thorough training."

The second part of the introduction deals with the "Proposed Normal Formation for a Battalion in first line." The battalion works in four lines, the front three being made up of two companies working side by side under their own captains. The three lines are respectively "shooters," one-fourth of each company, "re-inforcements," one-fourth of each company, "supports," one-half of each company, the "shooters," and the reinforcements are under the command of one officer of the company; the third line, the "supports," aiding the lines in front, and connecting them with the fourth line which is the reserve of the battalion, are commanded by another officer of the company; the captain is free to select his own position; the "supports" must be kept intact as long as possible, and as soon as men are sent from it to the lines in front, the task of support devolves at once on one of the companies in rear, which either united or separate from the battalion reserve. Each line has a certain amount of latitude of action. The directive authority of the commander of the battalion is maintained.

It is considered that at the moment of contact with the adversary, the number of men in the front three lines should be one man per metre; their strength is therefore regulated so that after a reasonable deduction, arising from losses and other causes, this result will be attained. It is assumed that a company on war footing commencing a campaign with 250 men, will, from causes operating outside the battle-field, soon be reduced to a strength of 200, then deducting

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further 16 men for staff (not rank and file), and 30 men (about $\frac{1}{2}$) for losses, there will remain out of the three lines in which each of the advanced companies was originally formed, 154 men. The two companies side by side will therefore at the decisive moment cover, in round numbers, 300 metres, or 327 yards. This front of 300 metres for the battalion, and 150 for a company, is accepted as the normal front.

With regard to the distances apart of the four lines, the Commission still regards 2,000 metres = 2,180 yards, as the limit of effective range of shrapnel (*obus à balles*), and therefore as the distance of the reserve from the enemy's guns when the shooting-line comes into action against them at 1,000 metres. This difference of 1,000 metres between the head and the rear of the battalion is a maximum. The reinforcements are placed 150 metres in rear of the shooters. The supports are 350 metres further back and consequently midway between the shooters and the reserve. These distances are of course subject to modification, but save under exceptional circumstances, the depth of a battalion is not to be less than 500 metres, as it is considered that if the lines be brought closer together it will be difficult to prevent those in rear taking part in the fight prematurely. Great stress is laid on the reserve remaining intact in the hand of the Battalion-Commander to the last moment.

In laying down the principle on which the attack is to be conducted, the Commission supposes that the artillery of the enemy is 600 metres in rear of his shooting line.

At 2,000 metres from the position, the battalion, already in line of company columns, breaks into the attack formation.

Before, however, following in detail the movements of these companies, a sketch of their interior organization is necessary. A company of French infantry is divided into four sections, numbered from right to left. The first two, form No. 1 peloton, the last two No. 2 peloton. On the peace footing, each section is divided into two squads (*escouades*), these are numbered respectively 1, 3, 5, 7, 9, 11, 13, 15, through the company. On service, the number of squads is increased by the addition of squads which take the even numbers. In those companies, however, which have twelve corporals the four sections are each divided into three squads, and on mobilisation, four others, numbered 4, 8, 12, and 16, are formed. Each of these squads is placed in charge of a corporal, and each squad will consist of 12 or 13 men. The company is, therefore, so organized that it may be broken up, even into sixteen pieces, and yet the men of each piece will find themselves under control. The Commission very truly observed in an earlier part of the report that much of the confusion of modern fighting was due to the absence of an organization reaching down sufficiently low. The theory somewhat inconsistently put forward by the Commission that a company can be efficiently commanded personally by one Officer is contradicted by the plain logic of facts, and the Commission practically refutes the idea by providing commanders for the sixteen fragments into which the company can, on an emergency, be divided. It is only in fact by the complete development of the squad system, which with weak companies

necessarily falls into abeyance, that the fighting of the future will be other than that of a mob.

The battalion in advancing to the attack is preceded, 80 metres in advance, by *éclaireurs*, whose duty it is to search and learn the ground for the benefit of the troops which follow. Even if cavalry be lending its aid, the *éclaireurs* are thrown out to the front.

Each of the leading companies sends forward a section to form its shooting-line, the section opening out gradually into line of squads at deploying distance; each squad remains grouped in close-order until ordered to deploy, and it is preceded by two *éclaireurs*. The deployment of the squads takes place at 800 metres from the enemy, the *éclaireurs* at the same time opening fire slowly. On arriving 200 metres nearer the enemy, the fire is opened along the whole shooting line, being reinforced, if necessary, from the second line. The shooting line advances in the orthodox manner in fractions by bounds, a process continued until 300 metres have been traversed, and they are at that distance from the adversary. Reinforcements are called up as required. After a few moments of rapid fire at this range, any portion of the "support" not already called up, and a company of the reserve which has replaced the "supports," advance in close formation to give a final impulse to the fighting-line at the decisive moment. The fourth company hovers about in rear, gradually moving forward, but carefully abstaining from taking a more active part in the operations. It is thus ready to avert a counter attack or to execute an attack in flank.

How to carry the assailant successfully over the ground lying directly under the rifles of the defenders, is a problem which has been determined to the satisfaction of theorists only. The Commission having to direct practice, not to enunciate theories, honestly admits that for this period of the fight it is impossible to lay down any rules. They object to a general advance firing, as throwing away ammunition and destroying that dash which is, under the circumstances, of special value.

"At this moment there can no longer be any rules, no mode of procedure can be laid down: one portion of the line favoured by the position of some obstacle, rushes rapidly towards it and assists the advance of the remainder by a well-aimed and well-sustained fire; units are no longer acting, but fractions of no particular size whose strength and number depend on circumstances only."

The only resource, the Commission says, is to resume the advance in *échelon* by bounds, the short halts being utilized for the delivery of rapid fire. On arriving within 50 metres of the enemy, shock tactics, if such are ever now called into play, or the dread of them, must effect the rest.

The fourth company now acts vigorously in support, always remaining under the hand of a commander, and either occupies the position, or else covers the retreat. As soon as this company enters into the engagement, the troops in rear are informed of the fact, and some of them are sent to replace it.

Having enunciated the principles which should govern the offensive, the Commission proceeds to deal with the defensive; and it may fairly

be presumed that the lessons derived from the bitter teachings of experience of the last war will have been turned to profit.

"In principle the hypothesis of a passive defence is absolutely rejected. The active defence, the only one dealt with here, should only seek in the choice of ground and in the attitude of expectation an increase to its own power, and the means of bringing the fight on to ground it knows, where it has arranged its troops beforehand, so as to strike the enemy with certainty and under the most favourable conditions."

The formation adopted for the defence is similar to that used in the attack; the distances between the lines are however less, and are not diminished during the action, each line remaining in its original position until required to take a part in the fight. The occupation of the front line may be continuous or at intervals, or in tiers; the minimum strength of rifles in the shooting-line is one per metre. The reinforcements and supports kept under shelter are called up as wanted. It is only when the efforts of the three advanced lines no longer suffice to hold back the assailant, that the two companies forming the reserve are called on to act. A portion of them is left in rear as a rallying point and support, while the remainder endeavour to create a diversion by a counter-attack in flank. The French are severely reproached by military writers for their neglect of an active defence during the last war; these writers are for ever urging the importance of counter-strokes.

Theorists, however, are very careful not to prescribe the details of this most difficult and hazardous operation. In fact, Boguslawski himself says: "The counter-attack, leaving your own position, has, however, now become a ticklish matter, and should, at most, be made only to a short distance. This is a serious undertaking, because it leads you at once into the enemy's fire without cover, and thus brings you into the most awkward position of modern warfare. You should think twice before you leave your shelter (from whence you are pouring a destructive fire) for this purpose."—"Tactical Deductions," page 174.

Notwithstanding, then, the advice so freely and gratuitously showered on the French in this matter, it will hardly surprise those who have studied the subject to find it dealt with in the "New Field Exercise," in the following brief sentences:—

"If the defence is not successful in keeping the enemy out of the position, the part of the reserve which has been retained in rear receives the front lines, rallies them, and endeavours to lead them back to the fight. At this moment the artillery fire of the assault has ceased, the assaulting troops are disorganized and out of breath, a counter-attack, executed energetically, with fresh troops, even though numerically weak, possesses chances of success. The commander of a battalion ought always to spare his troops in view of the eventuality; if he has to abandon the position, he will, aided by the second line, try, by a vigorous counter-attack, to drive the enemy out before he has time to make sure his footing."

"As to the counter-strokes to be made during the preparatory portion

“ of the attack, they must depend on particular circumstances, on the form of the ground, and on the faults committed by the adversary. No favourable opportunity will be allowed to escape. The fractions of troops thus employed will generally be taken from the companies in reserve; their action will be always seconded by an increase of fire on the part of its defence.”

Such, then, are the principles on which French troops will fight in future, whether on the offensive or the defensive.

In the third and last portion of the Report, the Commission deals with the important question of the method of instruction to be carried out in peace-time, laying down, incidentally, the common-sense maxim—first settle the tactics, then regulate the drill. The recommendations of the Commission seem thoroughly sound; whether they are altogether applicable to the French character, time alone can show.

There can be little doubt, however, that no system of instruction whatever can produce satisfactory results, unless, following the advice of the Commissioners, it is based on the development of the power of the individual, the combination of individual efforts to one common end, the maintenance of strict discipline, the zealous devotion of all available time to drill which is really useful, the engaging the interest of the young soldier in the instruction, the assimilation of peace-drill to the actual occurrences of actual war, simplification and uniformity in words of command.

NOTES ON FIELD GUNS.

By LIEUT. W. H. JAMES, F.G.S., R.E.

The German Guns are made of cast steel hooped round the breech with rings of the same material. The breech-closing apparatus is that known as the "Rundkeil Verschluss," i.e., a cylindro-prismatic wedge tightened in the gun by means of an interrupted screw acting perpendicularly to the axis of the bore. The gas-check is composed of a ring of soft steel; it acts on the Broadwell principle, butting against a steel plate in the surface of the wedge. Each gun carries three steel plates and three rings. The carriages are made of sheet-steel. The hand-spike is permanently attached to the left side of the trail. The elevating screw is similar to that formerly employed, except that the upper portion screws into the lower. The axle is of steel. There are no axle-tree boxes; but seats are provided for two gunners on the axle of the 9 c.m. gun. The wheels are Madras wheels with bronze naves. The method of packing the ammunition in the limbers differs considerably from any yet introduced. The projectiles are contained in two cupboards in the rear of the limber-box, which is of iron; each cupboard contains three hollow racks, each holding six projectiles for the 8 cm. and five for the 9 c.m. guns. The cartridges and necessary stores are carried in the top of the limber-box which opens in the usual way. The wheels of the limber are the same as those of the gun. The ammunition-waggons are those of the construction of 1864 (except the limbers which are the same as for the guns) and have merely been altered to take the new projectiles, but new waggons of iron are under experiment.

The common shell fired by the German field-guns is that known as the double-skin shell. It consists of two projectiles embedded one within the other; the exterior surface of the inner one being shaped into a number of pyramids which when the outer portion of the projectile is cast over them, rest in corresponding cavities in the latter. The result of this arrangement is a more regular fragmentation on explosion, and a larger number of fragments than is obtained with an ordinary shell, and there is no doubt that it is, *quâ* its man-killing powers, a far more efficient projectile. The shrapnel shell contains a larger number of bullets than the English one, but the bullets are lighter. The bursting charge of the German shrapnel is contained in a central tube. It is ignited by means of a time-fuse in which the composition is arranged in a ring. This fuse differs in no important particular from that in use since 1870 for field-guns in the Prussian service; but it is understood that a new pattern is under experiment. The percussion fuse used for double-skin shells is similar to that hitherto employed, with the addition of a safety-pin, which permits the shells to be carried ready fused in the limbers.

The French Guns are made of bronze, that portion of the bore towards the breech which is usually the first to show signs of corrosion, being lined with steel. They are breech-loaders, the breech-closing apparatus being similar to that in use in the French Navy for heavy guns, i.e., a solid interrupted screw. The surface of the thread of the screw being divided into six equal parts, the alternate ones are removed, so that one-sixth of a turn disengages the threads, and allows the breech-screw to be withdrawn. There is no gas-check, its place being supplied by the base of the cartridge which contains the powder charge. The cartridge-case has a brass base, the body being formed of sheet-iron lined inside and out with paper. On explosion, the base expands and effectually prevents the escape of any gas.

The gun-carriages are of iron and call for no particular remark. The limbers are also of iron, and an iron ammunition-waggon is undergoing trial.

The French have adopted to a slight extent the double-skin shell; but their principle projectial is the common shell. The bursting charge of their shrapnel is placed in front of the shell, and is ignited by a percussion fuse, time-fuses not being employed for any nature of projectile. These guns are only provisional and, as soon as steel guns have been manufactured in sufficient numbers for the regular army, will be turned over to the territorial army.

The Austrian Field Guns are of cast bronze, composed of 92 parts of copper and 8 of tin. They are cast chase downwards, are turned and bored, and the bore is then hardened and compressed by forcing coned steel mandrils through it.

The breech-loading apparatus is similar to that employed in the German guns; but the gas-check is made of copper and consists of a copper ring in the posterior end of the chamber, and a copper plate in the wedge.

The gun-carriages are of steel; the limbers are of wrought iron and are open behind in a manner analogous to the German limbers.

The common shell is similar to the double-skin shell employed in Germany, except that the interior portion is divided into a series of rings placed one on the top of the other, each ring presenting the appearance externally of a ring of pyramids. This construction is found to give even better results than the original type from which it was taken.

The shrapnel-shell resembles that employed in the English service in the position of its bursting charge, which is, however, larger. It is fired by means of a time-fuse.

The Austrian Artillery carry a small proportion of incendiary shells which are similar to the old-fashioned carcasses.

The gun above-mentioned is intended for the field batteries, that for the horse artillery is still under experiment, but will have a calibre of 2.95 ins.

The German and French projectiles take the rifling by means of a lead coating, that for the former being hardened. The Austrian shells are provided with copper rings on the Vavasour principle.

Comparative Table of German, French, Austrian, and English Field Guns.

Principal dimensions, &c.	German.		French.		Austria.	English.		Remarks.
	8 c.m.	9 c.m.	Canon de 5.	Canon de 7.	9 c.m.	9-pounder.	16-pdr.	
Calibre	3.09 ins.	3.46 ins.	2.95 ins.	3.35 ins.	3.43 ins.	3 ins.	3.6 ins.	* Not known. * Approximately only.
No. of grooves	24	24	14	14	24	3	3	
Depth of grooves	.049 ins.	.049 in.	.063 in.	.063 in.	.049 in.	....	....	
Length of bore from muzzle to end of chamber	74.27 ins.	73.48 ins.	63.27 ins.	63.75 ins.	*	66 ins.	68.4 ins.	
Ditto in calibres	24	21	21	19	21*	22	16	
Pitch of rifling	1 in 50 cal.	1 in 50 cal.	1 in 30 cal.	1 in 20 cal.	1 in 45 cal.	1 in 30 cal.	1 in 30 cal.	German and French shells are double skinned. The Austrian is a segment shell
Length of gun over all	82.67 ins.	82.67 ins.	78.74 ins.	79.22 ins.	82.67 ins.	71 ins.	74.45 ins.	
Weight, including breech- closing apparatus	860 lbs.	992 lbs.	1,038 lbs.	1,412 lbs.	1,071 lbs.	672 lbs.	1,344 lbs.	
Service charge of powder	2 lbs. 12 ozs.	3 lbs. 5 ozs.	1 lb. 14 ozs.	2 lbs. 8 ozs.	3 lbs. 5 ozs.	1 lb. 12 ozs.	3 lbs.	
Ratio of ditto to weight of shell	$\frac{1}{4}$	$\frac{1}{4.7}$	$\frac{1}{6}$	$\frac{1}{6}$	$\frac{1}{4.2}$	$\frac{1}{5.2}$	$\frac{1}{5.4}$	
Muzzle velocity	1,520 feet	1,460 feet	1,370 feet	1,280 feet	1,550 feet	1,390 feet	1,350 feet	* Not known.
Length of common shell .....	....	....	8.85 ins.	10.06 ins.	....	7.93 ins.	10 ins.	
Weight of ditto filled, with fuze	....	....	10.6 lbs.	15.4 lbs.	....	9.1 lbs.	16.2 in.	
Weight of bursting charge .....	....	....	7.4 ozs.	12.35 ozs.	....	8 ozs.	16 ozs.	
Length of segment, or double- skin shell	7.88 ins.	8.86 ins.	8.85 ins.	10.06 ins.	8.58 ins.	....	....	
Weight of ditto filled, with fuze	11.2 lbs.	15.4 lbs.	10.6 lbs.	15.4 lbs.	14 lbs.			* Not known.
Weight of bursting charge	6.8 ozs.	9.5 ozs.	9.15 ozs.	12.35 ozs.	*	....	....	
Weight of shrapnel, with fuze..	12.2 lbs.	17.9 lbs.	12.1 lbs.	16.9 lbs.	14.1 lbs.	9.75 lbs.	17.9 lbs.	
No. of balls in ditto.	122	200	46	45	165	60	128	

Principal dimensions, &c.	German.		French.		Austrian.	English.		Remarks.
	8 c.m.	9 c.m.	Canon de 5.	Canon de 7.	9 c.m.	9-pounder.	16-pdr.	
Weight of one ball.....	28 to the lb.	28 to the lb.	25 to the lb.	16½ to the lb.	*	25 at 18° 35 at 34° to the lb. .75 oz. 9.75 lbs.	72 at 18° 56 at 34° to the lb. 1.5 oz. 15.2 lbs.	* Not known.
Weight of bursting charge	.67 oz.	.8 oz.	.4 oz.	.7 oz.	3 oz			* Case shot are not now used by the French field artillery. The one here given was originally introduced with the gun, but is no longer in the service.
Weight of case-shot	11 lbs.	16.5 lbs.	....	*14.8 lbs.	15.8 lbs.			
No. of balls in ditto.	76 zinc	76 zinc	....	82 hard lead	120 hard lead	110 hard lead	176 hard lead	† Not known.
Weight of one ball	9 to the lb.	5½ to the lb.	...	8 to the lb.	†	16½ to the lb.	16½ to the lb.	
Weight per square inch of shell section, common, double-skinned, or segment shell	23.85 ozs.	26.21 ozs.	23.3 ozs.	27.42 ozs.	25.97 ozs.	20.52 ozs.	25.21 ozs.	
<i>Gas-Carriages.</i>								
Weight of gun-carriage equipped with gun.....	1,898 lbs.	2,062 lbs.	2,200 lbs.	2,926 lbs.	2,259 lbs.	2,044 lbs.	2,957 lbs.	
Diameter of wheel.....	55 ins.	55 ins.	58½ ins.	68½ ins.	52½ ins.	60 ins.	60 ins.	
Track.....	60 ins.	60 ins.	63 ins.	63 ins.	60½ ins.	62 ins.	62 ins.	
Rounds carried on gun.....	1 case	1 case	....	....	....	4 case	4 case	

Principal dimensions, &c.	German.		French.		Austrian.	English.		Remarks.
	8 c.m.	9 c.m.	Canon de 5.	Canon de 7.		9-pounder.	16-pdr.	
<i>Limbers.</i>								
Diameter of wheel.....	55 ins.	55 ins.	63 ins.	63 ins.	52½ ins.	60 ins.	60 ins.	* According to the nature of the ammunition box.
Weight of limber, packed.....	2,062 lbs.	2,206 lbs.	1,276 lbs.	1,694 lbs.	1,987 lbs.	1,749 lbs.	1,837 lbs.	
Rounds carried in limber—								
Common shell.....	....	....	24	* 22 or 24	....	12	12	
Double-skin ditto.....	24	20	4	3	....	....	....	
Segment ditto.....	....	....	....	....	20	....	....	
Shrapnel ditto.....	12	10	4	3	10	18	12	* Without gunners.
Case.....	2	2	....	....	4	....	....	
Total.....	38	32	32	28 or 30	34	30	24	
Weight, complete, behind team	3,960 lbs.	4,268 lbs.	3,476 lbs.	4,620 lbs.	4,246 lbs.	3,792 lbs.	4,784 lbs.	* Not known.
Number of horses.....	6	6	6	6	6	6	8	
Number of men carried on gun		2		*	2		2	* Without gunners.
Ditto on limber.....	3	3	....	2	3	....	3	
Weight per horse.....	660 lbs.	711 lbs.	579	770 lbs.	708 lbs.	632 lbs.	598 lbs.	* Not known.
Number of wagons.....	8	8	6	6	*	6	6	
Weight of ditto (with limber).....	4,686 lbs.	4,923 lbs.	*	*	4,721 lbs.	4,452 lbs.	4,621 lbs.	* Without gunners.
Number of horses.....	6	6	6	6	6	6	6	
Weight per horse.....	781 lbs.	821 lbs.	*	*	685 lbs.	772 lbs.	770 lbs.	* Not known.
Number of rounds in wagon—								
Common shell.....			72	66 or 72		36	22	* With 8 waggons. + With 6 waggons.
Double-skin ditto.....	56	50	12	9	....	....	....	
Segment ditto.....	....	....	....	....	55	....	....	
Shrapnel ditto.....	28	25	12	9	30	72	50	
Incendiary shell.....	....	....	....	....	5	....	....	
Case.....	2	2	....	....	4	....	....	
Total carried in wagon.....	88	77	96	84 or 90	94	108	72	* With 8 waggons. + With 6 waggons.
Total number rounds per gun carried by the battery.....	154*	136*	128†	112 or 120†	128†	142†	100†	

FORTIFICATIONS ON THE RUSSIAN-GERMAN FRONTIER.

The following notice in connection with this subject is taken from the "Revue Militaire de l'Etranger," of the 25th March last.

Fortifications of Posen. The "Russki Mir," of the 2nd March, contains the following article :—

"Posen correspondence, which we give below, will convince our readers that our neighbour, Prussia, notwithstanding the *entente cordiale* between the Governments, is directing all her efforts to arm as quickly as possible the frontiers contiguous to Russia, and is making Posen one of the strongest fortresses in Europe.

"The rapidity and the energy with which the works are being carried out, renders the fact doubly remarkable; no pause is allowed even in face of the enormous expense involved, and of the ruin which threatens the province through the appropriation of a vast amount of agricultural labour for the construction of the new works.

"We cannot pass by, in silence, an important fact which belongs to a past not long gone. During the last Franco-Prussian war, when Russia gave such aid to Germany, as the Emperor of Germany has himself openly declared, Prussia allowed no opportunity to escape of increasing and strengthening the fortifications of Königsberg, Thorn, Hætzen, and Memel, by employing French prisoners at the work. To the foregoing we will add the remarks made by one of our railway constructors recently returned from Paris. He tells us that the German railways leading from Berlin towards the Russian frontier are on a footing out of all proportion to commercial requirements. The quantity of auxiliary lines and sidings is very striking. These have no meaning unless intended for the rapid and easy transport of large bodies of troops.

"Are we taking corresponding measures? we may ask. We hope those who defend in Russia the civilizing influence of Germany, will forgive our suggestions."

The Posen correspondence alluded to is as follows :—

"Prussia is day by day working to strengthen her Russian frontier. In a little time Posen will be one of the strongest fortresses in Prussia; not even excepting the recently acquired Metz. A considerable number of advanced forts are to be constructed round the enceinte in the spring, commencing with three on the south-west and west of the town; on the left bank of the Wartha there will be two large and three small forts, and on the right bank four large forts. To facilitate the transport of materials for the construction of the advanced works, a road is to be made near the villages of Gourtchine and Younikow, in connection with the great Breslau Road. It is easy to imagine the vast amount of labour subtracted from agricultural

"work. The inconveniences thus arising have been foreseen by the military authorities, who have declared that they will only employ those labourers who have not made any previous engagements with farmers, proprietors, &c. This measure will, however, not be very efficacious, as the labourers, attracted by the high pay, will find plenty of excuses for breaking their engagements. Anyhow the construction of the forts threatens agriculture with danger, from which, profit will be derived only by those fortunate proprietors on whose property the works are to be erected. It is true that by law the State takes possession of their property, but on the other hand the loss is compensated by the very high prices paid. . . . Whilst these works are in progress, building is completely at a standstill inside the town. . . ."

The "National Zeitung," of the 8th March, endeavoured to reply to this article, but practically admitted that the transformation of old fortresses, on the Russian frontier, into fortresses of the modern type is in progress, a measure of self-defence, for taking which Prussia can hardly be blamed.

In connection with this subject we learn from the "Revue" of the 2nd of September that by a decree of the Minister of War, date 22nd July last, Glogau and Thorn, *têtes-de-pont* on the Oder and Vistula respectively, Neissi on the S.E. frontier, and Spandau, the arsenal near Berlin, hitherto considered fortresses of the second class are henceforth rated as first-class fortresses, as also is Kustrin at the confluence of the Oder and the Warthe, hitherto a third-class fortress.—(O.)

NOTICE OF BOOK.

"*Jahresberichte über die Veränderungen und Fortschritte im Militärwesen.*"¹

SUCH is the somewhat lengthy title of one of the most valuable military publications of the day. Indeed we cannot call to mind anything at all approaching it, either as to the mass of its information, the width of its scope, or the general excellence of its matter. The editor, Colonel von Löbell, must be a man of immense energy and talent to have devised and carried out so complete a plan. Colonel von Löbell deserves the gratitude of every scientific military man, and we sincerely hope that his efforts may meet with the practical appreciation they deserve. He proposes to make his publication an annual one, giving, as the title designates, reports of the changes and progress in the various branches of military art in the preceding twelvemonth. The number before us treats of last year, and is but the second that has been published.

There are many contributors—one Englishman, one Italian, one

¹ Mittler und Sohn, 69, Kochstrasse, Berlin.

Dane, one Dutchman, one Austrian, but the remainder, some twenty in number, belong to the German army, and principally to the *staff corps*. The foreign Officers give each a report on the organization of the army of their country. The Englishman, Lieutenant-Colonel Howard Vincent,—a frequent writer in our own pages, and lecturer in the theatre of the Institution—has an article on the Heerwesen Grossbritanniens. We confess that it appears to us unnecessarily brief, but the author excuses himself for treating his subject so cursorily by the fact that he had to write the article amid his travels and investigations last autumn in the Ottoman dominions.

The volume under our notice is divided into three sections, the first containing reports on the organization of individual armies; the second, reports on the various branches of military science; the third, materials for the military history of the year 1875. We shall not, we are sure, be overtaxing the patience of our readers if we look roughly into the details of each of these divisions.

The first contains, as we have said, reports on the organization of individual armies. It occupies nearly 300 quarto pages of matter, and really treats of every army in Europe. We presume that the bulk another year will not be so considerable, for it would almost seem, after reading these twenty reports, there is nothing left to learn, as far as theory extends, in the various military systems obtaining in Europe. To Germany, as of right, is assigned the place of honour. The names of authors are not, with the above exceptions, and wisely it may be, appended to the articles they contribute, so we cannot award more praise to the one pen than to the other. After the German report comes the Belgian, then the Danish, French, Grecian, British, Italian, Montenegrin, Dutch, Austrian, Portuguese, Roumanian, Russian, Swedish, Servian, Spanish, Turkish, American, and Japanese. Our limited space will not permit us to examine each report minutely. It is not, however, too much to say that they all, without exception, attain a very high figure of merit. In some cases, it is obvious the author has been obliged to rely, in a very great measure, on such statistics and information as penetrate through the diplomatic channel to the outer world; and the minuteness and accuracy which distinguish a report made upon the spot, are wanting. This remark applies peculiarly to the report on the Servian forces, exalted as high as any candidate for popularity in Belgrade and the Skouptschina could wish. In the Roumanian report, the Hohenzollern sympathy is decidedly apparent, and we are sorry in the Turkish to perceive a tendency to confound military matters with civil delinquencies. The French report appears to us to be impartially drawn up. It occupies nearly 50 pages of the volume (beside which Colonel Vincent's 11 pages look a little meagre), and though we regret its not coming from the pen of a Frenchman, for we assume it does not, as the name of no French Officer appears in the list of contributors, we must concede that the author has treated his subject most conscientiously. Colonel von Löbell having included even Japan in his search for military information, vividly brings home to our minds the activity with which the Intelligence Department of the

Berlin Staff Corps is administered, and not only the excellence but the extent of its sources of information.

The second division into which Colonel von Löbell has arranged his matter consists of reports on the various branches of military science. Nor is he here more behind-hand than with the reports on foreign armies. There is absolutely no department which Colonel von Löbell has not allotted to one of the Officers who write for him, and with such judgment have the tasks been given out, that the result is admirable. The first section is upon infantry tactics; and Germany, France, Austria, Russia, and Holland are noticed. Then follows a report on cavalry tactics, and the changes effected in the cavalry manœuvring of Germany, Russia, France, Austria, and England during the past year are recorded. Under the last subsection we find the recent orders for the movements of cavalry; and it even goes so far as to reproduce the memorandum of his Royal Highness the Field Marshal Commanding-in-Chief.

After the cavalry reports, we have reports on field and garrison artillery, on artillery train, on siege guns, on coast batteries, on gunpowder and the leading explosives, on small arms, on fortification. These are next succeeded by reports on the development of military statistics, on military supplies, on the Geneva Convention and its branch societies, on military telegraphy, on the Kriegsspeil, on military surveying, on map drawing, and on military literature. We are sorry to be obliged here to content ourselves with a bare enumeration of headings. It must necessarily rob our notice of much interest, but we have adopted this course as being the one best calculated to set before the members of the Institution the extremely valuable nature of Colonel von Löbell's compilation.

Nor is the third and last division inferior to the other two. It contains materials towards the military history of the year 1875. Commencing with a report on the Carlist war, going on with another on the hostilities in which the Dutch troops have been engaged, continuing with a necrology of the more prominent Officers who died last year, it concludes with a from day to day calendar of the leading military events in Europe, and a complete index of the contents of the whole volume. Indeed, as one reads on, one's admiration of the work cannot fail to increase. It is so complete, so impartial, that if anxious to find some fault, we must absolutely turn to the binding. This is in the loose German style. To cut the leaves is a serious labour; and it is not conducive to a temperament for study when the pages insist on coming out in the reader's hand. Before the work can be read with any comfort, it must be bound, and this is truly the only suggestion we find it possible to make concerning it. Every Officer should read the *Berichte* from end to end, and if ignorant of German, he should learn the language in order to be able to do so. Moreover, when the present volume is superseded by a successor, it will be a valuable addition to the impedimenta of a regimental mess. Once more we say that Colonel von Löbell deserves our gratitude; and, on behalf of the Institution, we tender him hearty thanks.

Royal United Service Institution.

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LECTURE.

Friday, 7th April, 1876.

REAR-ADMIRAL T. A. B. SPRATT, C.B., F.R.S., in the Chair.

ANCIENT NAVAL TACTICS.

PART I.

By the Rev. EDMOND WARRE, M.A., Eton College.

I CANNOT help feeling that at the very outset of this lecture an apology is due on my part for venturing to address an audience in the theatre of this Institution upon the very difficult, though interesting, subject of ancient naval tactics. For, in order that such a theme may be properly handled, three things are requisite: 1st, classical knowledge; 2ndly, a practical acquaintance with seamanship and naval construction; 3rdly, leisure; and of these three the two latter have fallen to my lot in but very scanty proportions. Hence the sketch that I am about to offer you will present many imperfections and omissions both to scholars and to nautical men; but the time that has been spent upon it will not have been wholly unfruitful, if by it, perchance, some member of the illustrious naval profession, who may happen to have both learning and leisure at his command, shall be induced to study this question, and throw light upon its many obscurities.

The subject before us is that of "Ancient Naval Tactics;" but, having regard to its vastness and complexity, it will be as well at once to introduce some limitations, so that we may not attempt an impossible task in sixty minutes. By ancient, therefore, we will understand Greek and Roman—dismissing altogether those interesting questions concerning the Assyrian, Phœnician, Egyptian, and Carthaginian navies, which might well form the subject of a separate discourse. Of the Greeks and Romans we shall find ourselves compelled to give most attention to the former, not only as presenting us with the best information, but as being in virtue of their seafaring habits, their constructive skill, and their tactical intelligence, *facile principes* in the naval art.

With these limitations, the consideration of ancient naval tactics will, in the first place, involve an inquiry into the character of the principal tactical units of which an ancient fleet was composed, their gradual development, their construction, and propulsion. Secondly, we shall find ourselves called to notice the weapons of offence with which these tactical units were armed, and especially the ram which has, owing to

recent developments, a peculiar claim upon our attention. Thirdly, we shall come to tactics proper; minor tactics, as exhibited in the handling of a single vessel, and grand tactics, as illustrated by such instances as we have of the disposition and manœuvring of fleets. Lastly, we may draw a comparison between the fleets of ancient and modern times, their power of propulsion, and the number of men employed.

Of these divisions of the subject, the first will more than occupy our time to-day; but I trust, through the kindness of the Council, that I may have an opportunity of dealing with the remainder at no very distant date.

The subject of ancient galleys is one which, as is well known, has a literature of its own. We can but briefly glance at this. A mere enumeration of the names of the authors who have expended their toil and their acumen upon it would cost us too long. The first, who, after the revival of letters undertook a treatise "*de re Navali*," was the Ambassador at Venice of the French king Francis the First, the Chevalier de Baif. No doubt, the sight of the grand galleys that thronged the blue waters of the Queen of the Adriatic suggested this work to him; but it also started him with prejudices as regards form and construction which made him labour to prove that impossible which the clear testimony of the ancients undoubtedly affirms. Once introduced to literate Europe, the subject, owing to its interesting character and obvious perplexities, became a favourite with the learned, and we find many great names attached to treatises upon it. Our own Sir Henry Savile, Provost of Eton, the great Scaliger, Scheffer of Upsala, Meibom of Amsterdam, and Isaac Vossius, are among those who, in the seventeenth century, entered the lists of the literary tournament "*de re Navali*." Of all these it may be said with truth that while each in his turn criticised the faults of his predecessors he fell into errors no less great himself; not, indeed, in most cases from want of learning, or of industry, or of literary insight, but chiefly because the *data* dealt with were insufficient, and the whole approached from the theoretical and not from the practical side.

During the last century, and indeed up to the last twenty years, Scheffer's treatise "*de re Militari Navali*" remained the best text book on the subject. Montfaucon in his "*L'Antiquité Expliquée*" gives some illustrations from the column of Trajan and the church of San Lorenzo, two of which have been enlarged for this lecture. With this exception there is nothing concerning our subject in the last century that calls for notice, except the ingenious and practical attempt of a countryman of our own, General Melvill, who caused, in the year 1773, a model of a quinquereme to be erected against a high wall behind his house in Pulteney Street, in which we are told that he "performed the motions of rowing with some Officers of both the land and sea service, and all agreed, as well as one of His Majesty's chief ship-builders, who had come to inspect it, that such and no other must have been the construction of the ancient galleys." Though we cannot quite endorse this opinion, since the side of the quinquereme in question appears to have been at a very

improbable angle (45°) to the water, yet we may say that the gallant General's attempt was certainly the most successful of those that have hitherto been made. In the present century Mr. John Howell, about the year 1826, constructed a trireme for the Edinburgh Society of Antiquaries. Of late years the subject has been handled with ability by Mr. Smith of Jordan Hill, whose solution, however, is found to conflict with the evidence of antiquity; and with plausibility by M. Jal, the author of the "*Glossaire Nautique*," and of two volumes on "*Archéologie Navale*." M. Jal's knowledge of mediæval shipping renders both these works extremely valuable, but his imperfect knowledge of Greek and Latin makes his conjectures as to ancient galleys misleading. It is very unfortunate that the trireme constructed at Paris by the order of the late Emperor Napoleon, under the superintendence of the very eminent naval architect M. Dupuy de Lôme, should have been built in accordance with the ideas of one whose interpretations of the ancient authors are at fault.

The honour of having solved many, if not most of the difficulties which have perplexed so many eminent men, must be given to the illustrious German scholar Boeckh, and his pupil Dr. Graser, who in an exhaustive treatise "*de re Navali*" has elucidated satisfactorily the most knotty points of this ancient problem. The discovery at Athens in the year 1834 of a number of inscriptions which proved to be inventories of galleys and their gear, belonging to the dockyard at the Peiræus, dating from a period not long subsequent to the close of the Peloponnesian War, was an event of the utmost importance in the history of our subject. These authentic documents of the Athenian Admiralty, when elucidated by the vast erudition and great critical ability of the author of the "*Public Economy of Athens*," and by the practical sagacity and genuine enthusiasm of his learned pupil Graser, have shed a flood of light upon the whole question of the construction of ancient ships of war.

Would it be out of place here to express a hope that as we have now the data upon which such a work could be undertaken with a prospect of success, funds and enthusiasm may be forthcoming now as they were a hundred years ago, and another attempt be made to reproduce the Attic trireme as it was in the days of Phormion or of Chabrias?

But we must hasten on to describe such a trireme, premising that we shall find but little help in the representations that remain to us on the coins, pottery, bas-reliefs, or pictures of antiquity. In the case of coins the scale is so small that but little can be gathered as to detail, though this field is not altogether barren with regard to the comparison of types of vessels of different epochs and localities. In the other representations the treatment is for the most part so conventional, and so devoid of perspective that but a few things can be learnt. The artist has generally been, as in the case of the representations on the column of Trajan, anxious solely to portray the figures of men and animals to advantage, the accessories, whether ships or houses, being treated in an arbitrary manner, and dwarfed out of all proportion. Still these representations are interesting as pre-

serving certain records of detail, and we shall find them useful for reference from time to time.

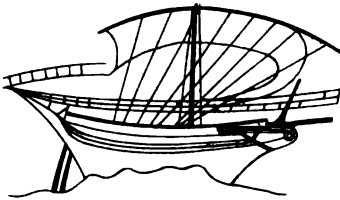
It is important to observe that the ancient ship of war was an improvement on the pirate vessel, just as the piratical craft itself was an improvement on the original merchant galley, and made with a view to superior speed and handiness. The trader, built to carry goods, was broad of beam and slow of speed, and gradually, as heavier weights were to be transported, ceased to depend upon oars, and trusted to sails for locomotion. The predatory instincts of mankind were not slow to equip themselves with craft fitted so as to be speedy enough to overtake the sluggish merchant-man, and at the same time roomy enough to stow away their ill-gotten gains. Not that in early times such gains were looked upon as ill-gotten. The Robin Hoods of the sea, whom we should deem cut-throat villains, were merry gentlemen in their own estimation, and in that of their neighbours, bold buccaneers, who were not ashamed of their profession. But the fact that they were enemies of civilisation was also patent, and the necessity of putting them down became more manifest as the advantages of commerce and free maritime intercourse were more generally appreciated. The mythological elevation to the judicial bench in the infernal regions of Minos, King of Crete, had perhaps, if we may venture a conjecture on such a subject, its origin in the stern justice with which that monarch repressed piracy, and the sense of the benefit that resulted to mankind from his efforts. He is mentioned by Thucydides as the first possessor of a fleet in Greek waters, and the historian tells us that he used it in establishing his Thalassocracy, or maritime dominion, by putting down the pirates. To this end, and thus early was the Greek ship of war elaborated. It is easy to see that the point in which it would be made to excel its pirate foes would be swiftness, and that this swiftness would be attained by construction with a view to carrying nothing but the crew and the necessary provisions and armament. Hence the ship of war was known as the "long ship" *par excellence*. Centuries, however, were necessary to perfect its construction. The ships of the Homeric period, long after Minos, were still undecked, except at the bow and stern, where they had fighting decks. We hear nothing in Homer of the ram, or of the distinction between rowers and seamen and marines, which is so marked at a later period.

In the simpler early vessel any increase in the number of oars necessitated an increase in the length of the ship, till at last a limit was reached, when a loss of handiness in turning outweighed the possible advantage of increased speed. Hence the invention of banks of oars; an invention by which the necessary distance of the "interscalmium," or space between the rowers' benches could be subdivided and utilised in such a manner that the oars might be doubled or trebled in number within the same horizontal space, and yet not clash together when worked in time. In order to comprehend better the principle upon which this improvement was effected, it must be understood from the first that, so far as we know, the ancients never, at any rate until late Roman times, employed more

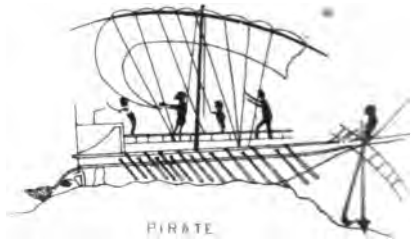
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EARLY GREEK VESSELS.

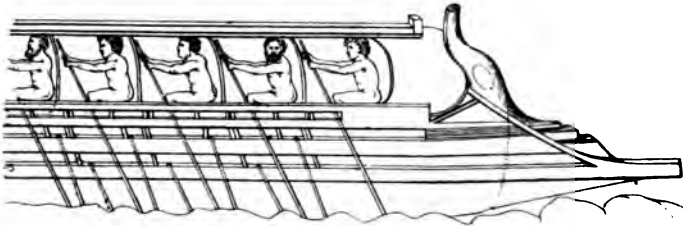
From Etruscan Vase in the British Museum. Date 700. 600 B.C



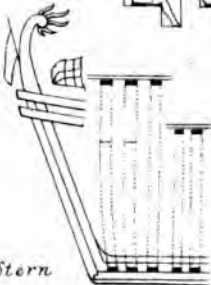
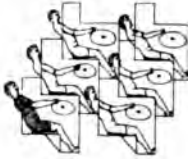
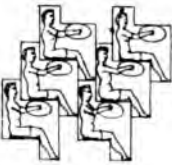
TRADER



PIRATE



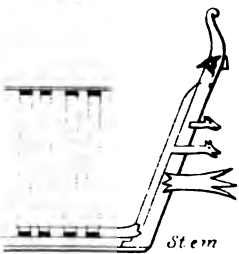
POSITION OF ROWERS



Stern



CONSTRUCTION



Stern



EGYPTIAN BOAT

than one man to an oar. The construction of the Venetian galleys,—whether “*alla scaloccio*,” in which long handled oars were worked by a number of men placed on successive steps rising inboard towards the centre of the vessel, or “*alla zenzile*,” in which the space of the interscalmum was subdivided by oars with handles of different lengths, so that the rower of the longest oar sat nearer amidship than his neighbour—was unknown to the ancients. Nor would it have suited their requirements in the long ships which had but a narrow space along the centre of the vessel, which they could not afford to lose. Accordingly, we find first among ancient ships single-banked galleys of 20, 30, 50, and up to 100 oars each, in which the usual interscalmum of two cubits gives us a conjectural ground for estimating their length. These are all embraced under the term of “*moneres*,” or “*monocrota*,” as striking the water with one beat. The first improvement upon this was the construction of the bireme which if we are to believe Pliny, is due to the Erythræans, Ionian Colonists of Asia Minor. If anything is to be inferred from this, it is that the first step in the improvement of the construction of galleys came from the eastern and not the western side of the *Ægean*, and in all probability was of Phœnician origin. “*Ce n'est que le premier pas qui coute*,” is a familiar and true proverb, and the invention does not deserve the slight notice which has been taken of it in ancient authors. When once the principle upon which increased power could be obtained by increasing the number of oars without lengthening the ship was discovered, it was easy to develop it, and it is worthy of notice that though the biremes gave place to triremes in the seventh century before Christ they ultimately survived them, and in the seventh century after Christ were in use when such a thing as a trireme was hardly to be seen. In like manner they in turn disappeared while their predecessors, the monocrota, survived. But to this growth and decay and its analogy in modern time, we may have to refer later on.

By whom the trireme was invented we know not. Probably by the Phœnicians, for there is a statement in the *Stromata* of Clement of Alexandria that the Sidonians were the inventors. All we are told by Thucydides is that the Corinthians were the first who built triremes in Greece, and further, that an eminent naval constructor of Corinth, Aminocles by name, did not confine his skill to the limits of his own country, but built four of these new ships-of-war for the Samians, of which event he fixes the date at about 300 years before the end of the Peloponnesian war, or about 700 B.C.

At this point we may proceed, taking Graser as our authority, to describe as briefly as possible, the principles of construction and propulsion in the case of the trireme and quinquereme, so that we may have some definite idea of the character of the vessels employed when we proceed to consider the naval tactics of the Greeks and Romans.

And first we must call attention to the fact that two classes of vessels appear to have been employed, distinguished by the name of “*Aphract*,” unfenced, or “*Cataphract*,” fenced, according as the rowers of the upper tier were protected or exposed. Both classes were

decked and floored, but the "Aphract" class carried their decks and flooring lower than the "Cataphract," so that in them the rowers of the upper tier were visible above the side of the vessel; this is distinctly seen in the bireme and trireme, given by Montfaucon from the Column of Trajan.

We have also an instance of the transitional form between the two classes, in the fragment of a bas-relief of an Attic trireme of which a cast is to be seen in the British Museum, and of which a sketch after Michaelis is given here.

You will remember that the disposition of the banks of oars was the problem to be solved, and that the object of arranging the oars in banks was to economise horizontal space, thus obtaining an increase in the number of oars without having to lengthen the vessel. Now, the rowers of the upper tier were called, from the elevated bench on which they sat, *Thranitæ*; those of the middle tier *Zygitæ*, from the *zyga* or benches, which, in the Aphract class of vessels, traversed the whole breadth of the ship and bore the deck; those of the lower tier *Thalamitæ*, from the *thalamus* or chamber in which (below the *zyga* in the Aphract class) they plied their oar. These names remained the same for the upper, middle, and lower tiers, even when the invention of Cataphract ships with high decks and more banks of oars than three, had altered the conditions of construction. The Aphract ships had their flooring one foot below the water line and the deck five feet above it.

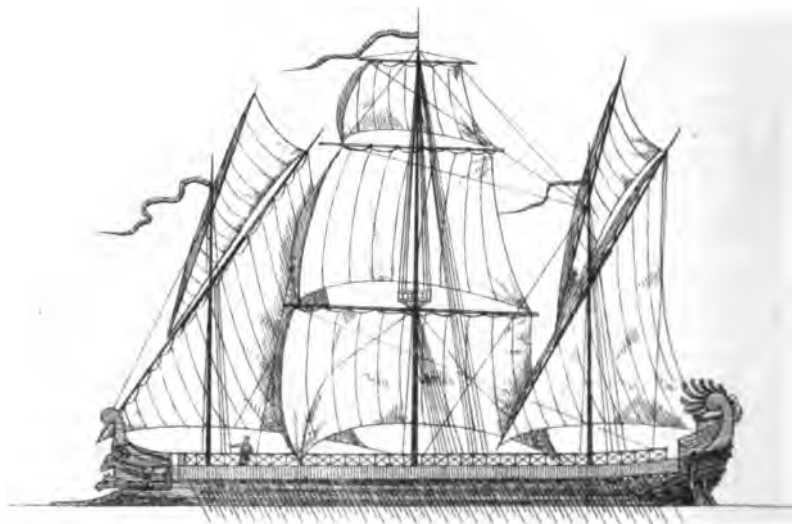
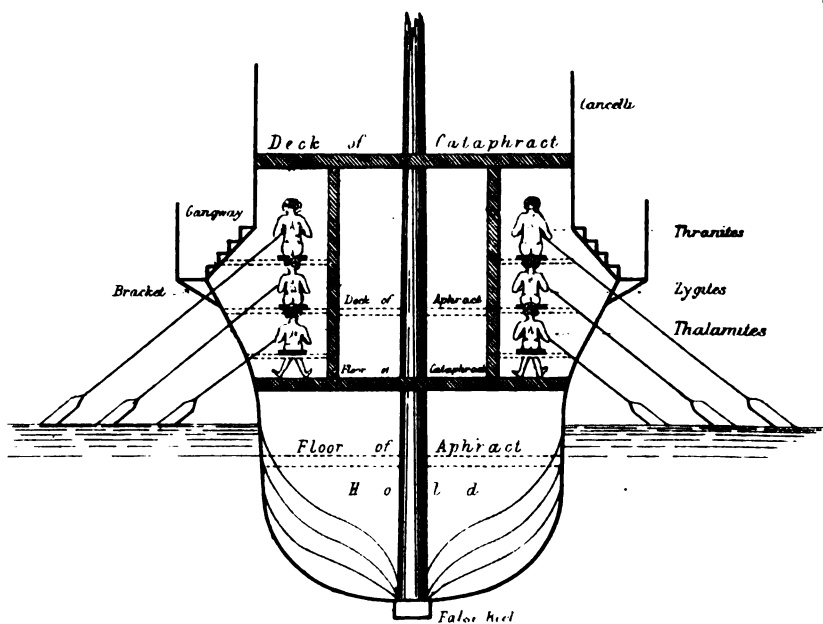
After the battle of Actium, which was won by the use of the light Liburnian biremes, which were Aphract, the Romans seem to have built most of their vessels after what was then considered the new, but was in reality the old fashion. Previous to that date, from the time of the invention by the Thasians of this system, all the larger vessels of war used by both Greeks and Romans were Cataphract.

In the Cataphract trireme, the space allowed for each oarsman was, according to Graser, eight square feet per man, and this proportion was observed in the larger vessels up to the octireme. In vessels with ten or more banks of oars the proportion allowed seems to have been reduced to seven square feet per man. We know from a passage in Cicero that the space was so completely filled and so densely crowded, that there was not room for an additional man.

The rowers in all classes of banked vessels sat in the same vertical plane, the seats ascending in a line obliquely inclined towards the stern of the vessel. Thus in the trireme, the Thranite was nearest to the stern of the set of three to which he belonged. Next behind and somewhat below him sat his Zygite, and behind and below the Zygite, the Thalamite. The vertical distance between the seats belonging to the same set was 2 feet, the horizontal distance 1 foot. The seat itself was from 9 to 12 inches broad. The lowest rank used the shortest oars, and the difference of the length of the oar in-board was provided for by the outward curvature of the ship's side. The oar ports were vertically 1 foot 3 inches below the handle of the oar when the blade was just touching the water. The lowest or Thalamite oar ports were 3 feet above the water. The Zygite oar ports were $4\frac{1}{2}$, the Thranite



TRANSVERSE SECTION.



SIDE VIEW OF TRIREME AS RESTORED BY 'GRASER'

5½ feet above the water. The vertical distance between the oar ports was but 15 inches, the distance obliquely measured on the ship's side 21 inches. Each oar port was protected by the *ascoma* or leather bag which fitted close over the oar, closing the aperture without impeding the action of the oar.

The seats of the rowers were supported on benches, three feet long, or thereabouts, which ran from the ship's side to beams which rose from the floor, and reached up to the under surface of the deck. These beams were inclined at an angle of 64° towards the stern, and were at a distance of four feet apart. They were technically called the *Diaphragma*. This *Diaphragma*, viewed from inside the vessel, presented the appearance of a succession of staircases, the steps of which were the benches between it and the ship's side. The space between the *Diaphragmata* on either side constituted that part of the vessel in which stood the masts, and in which stowage was possible. It was in the Attic trireme seven feet wide. This arrangement is clearly shown by the model of a section of a Greek trireme which we have here, for which we are indebted to the intelligent and patient labour and constructive skill of a present Etonian, Mr. Chambers.

The length of the oars used in the trireme has been calculated as follows. We know from the Attic tables the length of the oars used by the seamen or supernumerary oarsmen when there was need. These were the longest in the trireme, and they varied from 13 feet 6 inches to 14 feet 3 inches in length.

The Thranite oars must have been nearly of the same length, but could not have exceeded 14 feet under any circumstances.

The Zygite oars were 10½ feet. The Thalamite 7½ feet.

The rowers where the space of eight square feet was allowed per man had a vertical space of 1 foot 3 inches allowed for the rise and depression of the handle in rowing, and a space horizontally of 2 feet 6 inches for its forward and backward motion. It is, however, probable that there was hardly any motion forward of the body, the work being done by falling backwards from the perpendicular.

In all cases the oars used by the regular rowers preserved nearly the same proportion of one-third inboard to two-thirds outboard.

The oars of the upper ranks projected at the point where they reached the water 2 feet 6 inches beyond those of the next lowest tier.

In the case of the gigantic oars of the Tesseraconteres of Ptolemy, a vessel of the size of the "Agincourt," we are expressly informed that the handles were weighted with lead, so as to bring the oar inboard and outboard nearly to an equilibrium.

For the purposes of comparison I have appended a table showing the length of oars used in the different classes of ancient vessels, in the British Navy, and in the University and Eton eights.

Let us now proceed to consider the construction of the vessel itself. In the Cataphract class, the floor was 1 foot above the water-line. Below this was the hold which contained a certain amount of ballast. Through the floor into the hold, the buckets for baling, or as we

should say the pumps, were worked, and that very constantly in ancient vessels, as the use of the word both by the poets and orators in metaphors expressing labour and sorrow, amply attests.

The keel (*τροπίς*) of the early ancient ship appears to have had considerable "camber." Under this was a strong false keel (*χέλυσμα*), which was very necessary in vessels that had frequently to be drawn up on the shore. Above the keel was the kelson (*ἐρύσχον*, *columba*), into which the ends of the ribs were fastened. Above the kelson lay the (*δευτέρα τροπίς*) upper false keel in which the mast was stepped. The stem (*στεῖρα*) rose from the keel at an angle of 69° to the water. Within was an apron (*φάλκς*) giving solidity to the bows which had to stand the weight of the beak and its concussion. The stem was carried upwards and curved generally backwards above the forecastle, terminating in an ornament which was called the acrostolion (*ἀκροστόλιον*). The sternpost rose at the same angle as the stem, and was carried high over the poop curving inwards, and finishing in the aplustre, an ornament which may be likened to the feathers on the head of an angry cockatoo; and behind this curved backwards the cheniscus or goose head, symbolising the floating powers of the vessel.

Round the hull of the vessel horizontally at about the level of the feet of each bank of rowers, stretched waling pieces (*νομείν*), and in the case of the Attic triremes, these were again strengthened by long cables (*ὑποζώματα*), which were bound round the ship from stem to stern, and which tightened by shrinking when wet, gave additional security to the vessel, which from her length and narrowness was apt to strain much in bad weather.

From the side of the vessel below the level of the thranitic bench projected the gangway (*παρόδος*, *fori*), for a space of 1 foot 6 inches, giving a passage of 3 feet in all. This was supported by (*βίαχα*) brackets fitted below and springing from the ribs of the vessel. The gangway was fenced in by an upright bulwark extending the whole length of the space occupied in the ship by the rowers. Here, in the "Parodus," the (*περίνευ*) seamen had their station in action as light-armed troops; who also, when needed upon special occasions, rowed as supernumerary oarsmen with the long oars already mentioned.

The ribs of the vessel from the point where the bracket fitted to them, curved upwards and inwards to a height which was 10 inches above the heads of the thranitic oarsmen. Upon them at this height were placed the cross beams (*στρωτήρες*), which supported the (*κατάστρωμα*) constratum or deck, which was thus a clear 3 feet above the gangway, allowing the marines (*ἐπιβάται*) in action, free play for their javelins over the heads of the seamen in the Parodus.

Beyond the space occupied by the rowers, there was the Parexeiresia, a space of 11 feet in the bows and 14 feet at the stern, which included the (*ἔκρη*) fighting deck already noticed in the Homeric vessels. On either side of the main deck rose the *cancelli*, an open lattice work, and seen as such in the Aphract ships, but in the Cataphracts usually covered with hides, or with the (cilicium) goats hair curtains of that manufacture, at which St. Paul and Aquila and Priscilla used to labour working with their hands. This served

both as a protection against the waves and to a certain extent against the darts of the enemy.

At the bow and stern, towers, especially in the Roman vessels, were often erected which gave a vantage height from which to shower down missiles on an enemy's deck.

In very early times we find the elevated forecastle, of which the very name is significant, and which, in some cases, strikingly reminds us of the structure erected at the bows of the "Devastation," serving to protect the fore deck from the waves, and the crew and marines from a raking fire as they approached the enemy,

On either side of the forecastle was figured the eye of the vessel, the centre of which was formed by an aperture which served as a hawse-hole.

At the stern was a raised quarter-deck, on which was a kind of cabin or deck-house forming a shelter for the chief Officer and the helmsman. This quarter-deck was the sacred part of the ship. Here was the image of the patron god, not to be confused with the parasemon, or badge of the vessel figured near the bows. Behind the deckhouse rose the flag staff on which was hoisted the pennant (*tænia*) and probably in the case of the admiral's ship, the red flag that was the signal for going into action, and such other signals as were from time to time required.

On either side the bows catheads (*ἐπώτιδες*) projected, which in the case of the earlier Athenian triremes seem to have been merely sufficient to hold the anchor. The Corinthians, however, who, as we have seen, were enterprising and clever shipwrights, by strengthening greatly these catheads, were able to receive a blow from the enemy's ram in such a way as to inflict the damage they were intended to receive, an invention which cost the Athenians dear, both in the Corinthian Gulf and in the great harbour at Syracuse.

Between the catheads, and in front of the stem, projected two beams one above the other at some distance apart, headed generally with metal fashioned as a ram's head, or the head of some other animal, which were called respectively *προεμβολίον* and *προεμβολίς*. The purpose of these beams seems to have been to give a racking blow to any vessel pierced by the beak, which projected much further below, and thus to cause her to heel over and shake off, making it easier for the impinging vessel to disentangle herself by backing water.

Underneath was the rostrum or beak, answering to that which we now call the ram, which was a long spur, and in the later periods usually divided into three teeth. Of this we shall speak more fully hereafter.

The trireme was steered by two paddles or rudders, one on either side of the stern of the vessel, to the tillers of which, under the deck, was attached a rope, which, passing through a block on either side and over two wheels on the quarter-deck, enabled the helmsman to turn the two rudders which way he pleased by a single effort.

In the mid space of 7 feet, which we have already mentioned, as lying between the Diaphragmata, stood the main, or great mast, which was square rigged, and before and behind it the two *acati*, fore mast

and mizen mast, which carried lateen sails. The ancients, however, did not use sails in action, trusting then entirely to their oars, so that I will not enter further into the question of the rigging.

We may now (for I fear that we are already surfeited with detail) briefly sum up the measurements of the trireme as calculated by Graser, so as to complete the picture of the vessel such as we may fairly imagine it to have been.

The total length (exclusive of the beak, for which we must add nearly 10 feet), was 149 feet, of which 25 feet belong to the *parxeiresiæ* (11 to the bows and 14 to the stern) and 124 feet to the space occupied by the rowers.

The greatest breadth (which has been calculated in an ingenious manner from the thickness of the hawsers employed for anchoring the vessel, (a detail preserved to us in the Attic Tables) at the water line was 14 feet; above, at the broadest part of the beam 18 feet, and with the gangways added 21 feet. The space between the Diaphragmata was 7 feet.

The height of the deck in Cataphract ships above water was 11 feet. The draught, $8\frac{1}{4}$ feet. Total height, $19\frac{1}{4}$ feet. Thus leaving $10\frac{1}{2}$ feet for the hold. The height of the aphract trireme from water to the top of the gunwale is calculated at 8 feet. The capacity of the Cataphract trireme, calculated according to the modern formula of measurement gives 232½ tons.

As all the Attic triremes appear to have been built on one and the same model, their gear was interchangeable. It is obvious that such an arrangement in a fleet of from 300 to 400 vessels would offer great facilities in refitting.

The regular crew of an Attic trireme consisted probably of 225 persons in all. Of these 174 were employed in rowing, disposed as follows:—54 Thalamites, 58 Zygites, 62 Thranites, the upper oars being the most numerous, as the contraction of the vessel near the bow and towards the stern afforded less space for the lower tiers. Besides the rowers, there was a force of 10 marines, heavy-armed soldiers, and 20 seamen. The number of marines seems to have varied greatly, and depended much on the style of fighting preferred. Where, as in the case of the Athenians, speed and dexterity in the use of the ram were the chief tactical features, fewer marines were employed. Xerxes' great fleet carried 30 marines to each trireme. We hear of forty picked men on board each Chian vessel at Lade. The Corinthians and Corcyreans had their decks crowded at the battle of Sybota; and the unfortunate Athenians, in the great harbour of Syracuse, where there was no space for their usual methods of manœuvring, found themselves obliged to imitate their enemy's tactics in this respect, with disastrous results.

Of the officers the chief was the Trierarch or Captain, and next to him the master (*κυβερνήτης*), who was responsible for the steering and sailing of the vessel. Each tier of rowers on either side had its captain (*στοιχαρχός*). There was also the (*πρωρεύς*) boatswain, the *keleustes*, who gave the time to the rowers, a steward, a purser, and their subordinates, and last, not least, the ship's piper (*τριηραυλῆς*).

We have thus completed our sketch of the trireme, and from it we

may also form, without any difficulty, an idea of the larger vessels, quadriremes, quinqueremes, &c. The principles of construction in these were exactly the same, the additional tiers being added by carrying on the Diaphragmata upwards, and at the same regular intervals inserting the thwarts on which the rowers' seats rested. The increase in the size of the whole vessel was not as large as one might at first expect. In order to avoid entering into further detail I have prepared a table from Graser, which exhibits clearly the difference. The increase in the size of Greek vessels began after the Peloponnesian war, and seems to have culminated in the time of Demetrius Poliorcetes, who manœuvred with vessels of sixteen banks of oars, and we hear of nearly every number of banks of oars up to that figure. The huge tesseraconteres of Ptolemy Philopater, with its forty banks of oars, was in reality a costly toy, and of no practical use. A minute and curious description is given by Graser of this great ship, but I fear that we must not delay upon it here.

The Romans who copied a quinquereme which fell into their hands in the first Punic War, appear to have used vessels chiefly of that description. They did, however, build much larger vessels up to the time of Actium, when the defeat of Antony and Cleopatra's great ships, by the light Liburnians, altered the whole fashion and prepared the way for the disappearance of the great banked galleys, and the almost complete loss of the knowledge of the principle on which they were constructed.

An interesting question arises at this point, and one not easily solved, as to the pace at which these galleys could be moved. We may make a comparison between the man-power of the galley and the horse-power of the modern ship of war. The difference in the bulk to be moved is very great and the inferences derived may be misleading. Taking, however, one horse-power to be equivalent to between 7 and 8 man-power, we may say that the trireme was propelled by a force equal in amount to about 24 horse-power, the quadrireme by about 32 horse-power, the quinquereme about 42, and so on, increasing a little more than 10 horse-power for each tier of oars added. It is, however, obvious, that the man-power cannot be counted upon as applied to the oar with that uniformity which is attained by the use of steam in the case of horse-power.

There is a passage in Xenophon (*Anab. vi, 42*) in which it is stated that from Byzantium to Heraclea, in Bithynia, a distance of about 150 nautical miles, could be rowed in a day by a trireme, and was a very long day's work. Now, allowing eighteen hours' daylight for the work, a speed would have to be maintained of over eight knots. This, considering the shape of the vessel and the man-power employed, may perhaps seem excessive, but if such a speed could be maintained on an average for a whole day's voyage, it is obvious that in action or when any special effort was required, a greater pace, say perhaps 10 knots, could be attained.

Such speed we may believe was attained, if at any time, in those famous encounters, in which the vessel itself was the missile hurled at the enemy, when, in the prime of her Thalassocracy, the rapidity

and agility of the trireme of Athens was the terror alike of her Greek and her Phœnician foes. Long and careful training had perfected the system of rowing and steering. The vessel itself was shaped for speed by the cunning master builders of a people whose eye for form has never been surpassed. To the attainment of the highest possible speed everything was sacrificed, till at last the thin sharp bows were incapable of standing a concussion with the heavy mass presented to them by Corinthian and Syracusan constructors, and suffered themselves the damage they were intended to inflict upon others.

Time will not allow me here to follow out in detail the second part of my subject, the development of the ram in its successive types, from the sharp Assyrian spur, the old Phœnician fish-like snout, the early Greek boar's head, which we can trace down to the third century on coins, to the three toothed rostrum of the early Macedonian and later Roman epoch.

I should have liked, had time sufficed, to have touched upon some of the instances of single encounters, such as those of Artemisia, and of the Samothracian vessel at Salamis, and of Phormion's Captain off Naupactus, and further, to have pointed out the causes why the (*πρὸςβολή*) direct attack stem-on, that, which in the eyes of the Athenian was the unskilful and unseamanlike manœuvre, prevailed over the skilful attack on the enemy's quarter or side (*ἐμβολή*), success in which was the glory of the Attic sailor; to have shown how, as Thucydides aptly calls it, "land fighting at sea" became the rule; how grappling irons, and boarding bridges, and ponderous missiles, ultimately superseded ramming tactics to such an extent that Brutus, off Marseilles, exposed the sides of his great vessel on purpose to the enemy, trusting to the thickness of his timbers, and making sure of destroying his smaller antagonists with the ponderous weight swinging from his yardarm.

Time, however, forbids me to enter upon these points; and in conclusion, if I have not already tried your patience too long with what I fear has been a somewhat dry mass of details, I would ask you to leap back with me in thought over long centuries of the past that we may imagine ourselves standing in the Peiræus, with the glories of Athens behind us, the great spear head of the goddess who guards the Propylæa flashing the reflected ray far across the Saronic Gulf, where in front of us lies bright Salamis, and beyond, Ægina, once called the eye-sore of the port in which we stand.

It is a busy bustling scene, one that would rival our own Portsmouth and Plymouth in a time of war. There are the long sheds in which the triremes have been housed during the winter, but they are mostly empty (for is it not April?), and the rollers on the long stone ways have run down many of the dry keels and launched them already. It is April, 415 years before Christ, and the Athenians are preparing their fleet for their grand and fatal expedition to Sicily. They dream of conquest, of the conquest of the golden west. The triangular land is the stepping-stone to greater things beyond. Nearer home there are enemies, but ambition is stronger than fear, and we fit out our fleet and send our picked men for distant enterprises, while the enemy is not

very far from our own doors. And so the dockyard is all life. Look at the huge coils of hawsers, at the rows of anchors, at the stacks of oars, all carefully marked, all arranged with precision. There in the harbour are already lying some hundred sail, some few ready to start for Corcyra, but most still fitting out with all haste. What shrill pipings, what a clatter of tongues, what a smell of pitch. Yonder goes Lamachus the busiest of the three Admirals, and the most practical. He sees to details with the eye of a master who means business, and knows that real work is grim work. Fine young Alcibiades will be down in the afternoon on a four-in-hand from town. He gives himself airs, but is clever and brilliant, and handsome, and with the exception of some old sea dogs, hard bitten ones who dislike the smell of jockey-club and musk, and growl about effeminacy and affected manners, his subordinates like him well enough. And here comes kind well meaning Nicias, a good man, and well esteemed, but hardly the stuff for such a command, though his good fortune has been tried up to the present time and has never been found wanting. Truly it were better to die young than to be so fortunate. And the chiefs being there the work is not slack. The hammering goes on with redoubled vigour. The petty officers have their hands full and look serious, the comptrollers of accounts are in dismay, the trierarchs are sure they will be ruined. But there is a strong will behind them all, and a nation's behest is not easily disobeyed, and fancied impossibilities both as regards time and space are reduced by hard work to possible proportions. And so the fleet is fitted out, and if we will return after a few days, we shall see in company with all Athens, a spectacle which none will forget to his dying day, which now may draw tears of mingled pride and sorrow, pride patriotic, and sorrow for those who are going away, but the recollection of which hereafter will command, alas! far more bitter tears of shame and grief; shame for country humbled, and grief for those who will never return. There in the glorious bright blue bay, float, fully equipped, as we have described, one hundred triremes, 60 as men of war, 40 as transports. They are to start solemnly with a nation's prayers and a nation's blessing. The pennants are waving in the breeze, the acrostolia are crowned with flowers; the piper sounds the rowers to their seats, and then silence is demanded by the long blast of the bugle from the Admiral's flag-ship, caught up and re-echoed by the ships of each of the three divisions. Then are the prayers offered and the libations poured to unwilling deities by brave hands, and hearts ignorant of the future, and the signal being forthwith given, more than 17,000 oars dash into the water together, and the whole fleet starts in one splendid trial of speed towards Ægina. We strain our eyes after them until the white sails are set, and the hope and strength of Athens fares onwards out of sight, to a distant enterprise, the issue of which with all its pride and all its folly, with its glory and its misery, will adorn history, and point a moral for maritime powers in all time to come.

APPENDIX.

*Table showing Comparative Length of Oars.**Athenian Navy.*

	Inboard.	Outboard.	Total.	Blade.
	ft. in.	ft. in.	ft. in.	ft. in.
Quinquereme	6 6	13 0	19 6	
Quadrireme	5 6	11 0	16 6	
Trireme, Thranite	4 6	9 0	13 6	
„ Zygite	3 6	7 0	10 6	
„ Thalamite	2 6	5 0	7 6	

British Navy.

	Inboard.	Outboard.	Total.	Blade.
	ft. in.	ft. in.	ft. in.	ft. in.
Largest	5 3	12 9	18 0	0 5½
Medium	3 5	11 7	15 0	0 5¼
Smallest	2 6	9 6	12 0	0 5¼

Oxford University Eight.

	Inboard.	Outboard.	Total.	Blade.
	ft. in.	ft. in.	ft. in.	ft. in.
1876	3 8	9 1	12 9	0 6

Eton Eight.

	Inboard.	Outboard.	Total.	Blade.
	ft. in.	ft. in.	ft. in.	ft. in.
1875	3 6	9 0	12 6	0 5¼

Table of Measurements, &c., from Graser.

Class of Vessel.	Trireme.	Quadrireme.	Quinquereme.	Tesseraconteres.
Length, exclusive of rostrum	149 feet.	158½ feet.	168 feet.	420 feet.
Breadth at waterline	14 "	16 "	18 "	57 "
" greatest	18 "	22 "	26 "	76 "
" with <i>πάροδοι</i>	21 "	25 "	29 "	79 "
" between <i>διαφράγματα</i>	7 "	9 "	11 "	49 "
Draught of water	8½ "	10 "	11½ "	20 "
Height of deck, Cataphract	11 "	13 "	15 "	44 "
" " Aphract	8 "	10 "	12 "	
Tons measurement	232½	365	534	11,320
Number of rowers	174	240	310	4,054
Estimated horse-power	24	32	42	540
Crew, total complement.	225	300	375	7,500

Triaconter, 54 feet long,
Penteconter, 90 feet long, } two masted.

The CHAIRMAN : I am sure that we all feel deeply impressed with the fact, that we have just heard a most interesting lecture, and not only a very interesting, but a very learned and eloquent one, especially in the moving words with which it was concluded. But what I also myself feel, and strongly feel, in consequence, is a deep regret that a more fit and competent person is not in the chair on this occasion. For I was requested to fulfil this honour purely through having a larger acquaintance with the localities referred to in the lecture—the scenes of the great naval battles and contests mentioned—than most of the members likely to be present.

That advantage has undoubtedly tended greatly to enhance the interest of the lecture with me, and I am sure that there are some present who are likewise familiar with some of these localities, and have felt a similar enhanced interest.

The lecturer referred to, and recommended to your notice, Mr. Smith's book, on "The Voyage of St. Paul." Mr. Smith was an intimate friend of mine, and spent a winter in Malta whilst I was there; and as an able geologist, he had intended, during his stay, to work out the geology of Malta. But, as I happened to be a mere smatterer in this branch of science, I had been induced just previously to do the same. Mr. Smith thus finding that the labour of his hope and love had been somewhat forestalled, as he himself told me, was induced to take up the voyage of St. Paul, from its special interest in connection with Malta. We were, therefore, frequently in communication with regard to it, and to the construction of the ships, mode of rowing them, &c., of the ancients of that date. Mr. Smith has in that work given a chapter of great interest upon the form and position of the oars and rowers in the quinquiremes, triremes, &c., as he had conceived them to be. But I must confess that, although there was much that was new in it bearing upon the subject, yet it did not fully satisfy me that we yet understood the exact construction of the ancient Greek and Roman ships of war, so as to know how the rowers of the several tiers were placed. Now, however, I fully understand it, after the beautiful illustrations, and the clever model made by the Eton boy, that has been so often in the hands of the learned lecturer during the delivery of his most instructive and most interesting discourse. I must not, however, try your patience further with more remarks of my own, but at once fulfil the duty that now devolves upon me, of asking you to accord your hearty thanks to the learned lecturer for his very instructive and interesting lecture, and also to the Eton boy for the clever model his talent has produced, and that has tended so much to assist the lecturer in his description, and ourselves in understanding the difficult points of the subject.

LECTURE.

Friday, June 2nd, 1876.

REAR-ADMIRAL T. A. B. SPRATT, C.B., F.R.S., in the Chair.

ANCIENT NAVAL TACTICS.

PART II.

By the Rev. EDMOND WARRE, M.A., Eton College.

IN resuming the subject of Ancient Naval Tactics this afternoon, I propose to follow the lines laid down in my first lecture, and to treat in the first place of the weapons of offence used in ancient vessels, and of the means employed to meet them. The consideration of the progressive improvements and alterations made for offensive and defensive purposes in the construction of vessels, and their armament will naturally bring us to our main and proper topic—the naval tactics of the ancients. These will fall under two heads: *minor tactics*, which concern the handling of a single vessel, and *grand tactics*, which concern the handling of fleets. For illustration, we shall have to refer to incidents of Greek and Roman warfare recorded by ancient authors, and it is possible, though I am not very sanguine upon this point, that the consideration of those ancient conflicts may be suggestive to those whose attention is given to the important subject of modern naval tactics, which have at least the use of the ram in common with those of the ancient world. Lastly, if time allows, we may glance at the growth and decline of the ancient marine, and the causes that produced these effects, and attempt to draw some comparison between the size and tonnage of ancient and modern fleets, and the number of men employed in them respectively.

Of the weapons of offence with which ancient ships were armed, the ram, or, to speak more correctly, the beak, was for a long period the most formidable, and that from very early times. If we are to believe Pliny, the invention was due to one Piseus, a Tuscan pirate chief, who, according to a quotation given from Manetho, was master of Italy for a considerable time. There does not, however, seem to be much in support of this statement; all the other evidence we have points to Egypt or Phœnicia, the east, and not the west, as the cradle of this

invention. There is, as I have already said, no direct mention of the beak in Homer, who, however tells us how

“ round the vessel’s prow (*στρίψῃ*)
The dark waves loudly roared as on she rushed
Skimming the seas and cut her watery way,”¹

a passage which seems to me to indicate that an advance in build from the earlier type had already been arrived at in Homer’s time. The later poets, indeed, speak of the war-vessels of Greeks as armed in Trojan times with brazen prows, and in a fragment of *Æschylus*. Nestor’s ship is called a ten-beaked or ten-spurred ship (*δεκάμβολος*). I am not, therefore, disposed to regard the silence of Homer as proving that the beak was unknown to the Greeks in Trojan times.

We have in Diodorus a statement regarding a conflict which has been claimed as the most ancient sea-fight whereof this world holds record, to the effect that “Semiramis, when she reached the Indus, found the King’s fleet prepared for battle, put her soldiers on board her own flotilla, attacked him, and after a desperate struggle, in which nigh a thousand vessels were sunk, won the victory.” This statement finds support in several other passages, and amongst them in one from Suidas, in which he says that “Semiramis had constructed in Bactria 3,000 vessels of war with brazen beaks (*χαλκέμβολοι*), the crews for which were furnished from Syria, Phœnicia, Egypt, Cyprus, and Cilicia.” Such legendary splendour surrounds Semiramis that one is quite sorry to find her either sublimated into a solar myth, or reduced by a prosaic inscription to the position of consort to Pul, King of Assyria, and her date brought down from the time of Abraham, assigned to her by Eusebius and Augustine, to the much later figure of 740 B.C. There is in the British Museum a very spirited representation of an Assyrian war-galley, moving at full speed, such a galley as we may imagine the warrior Queen to have employed. The beak in this case has the character of a pointed spur attached to the bows of the vessel at the water-line.

If ancient authors fail to tell us any more than this concerning the invention of the ram, we must turn for information to those early representations of vessels which the venerable and ever fresh antiquity of Egypt has preserved for us.

In his earliest efforts to construct a ship from sawn planks, man found himself assisted by the natural tendencies of the material employed. The natural curvature of planks fastened together in the middle, on a curved pair of ribs, which would represent what we should call the midship section of the vessel, determined in the first instance to a great extent the shape of the bow and stern. These in the earliest vessels were nearly alike, a feature which though it obtained in trading vessels to a late period, is wrongly attributed to all ancient vessels by Mr. Smith, of Jordan Hill. We see this early type clearly shown in the representations which so often occur on Egyptian sarcophagi of the craft in which the souls of the dead are

¹ Il., i, 482. Lord Derby’s Trans.

being carried on their last voyage by attendant deities.¹ These are worthy of our attention, not only as being extremely ancient, but as giving us a point of departure in the history of the construction of the beaked prow. Both ends of the boat are alike sharp, and upon both the superstructure is carried in a curve backwards and upwards so as to afford protection from the waves, presenting us with the rudimentary outline of that which was afterwards to develop into prow and poop respectively. The top of the structure above the prow is often flattened and covered in, and upon it is seated a guiding deity, the prototype of the "look-out" man at the bows in later time. The keel, as is evident, has great camber fore and aft, bad for speed, good for turning quickly, useful in the case of a boat steering down the current of father Nile, but not so advantageous when some distant village had to be reached across his wide inundations. The *loi d'épargne*, the law of least effort, which as part of the many-sided necessity that rules so largely in human affairs, is the mother of manifold invention, would soon, where human labour at the oar was too lavishly expended, teach men, as they built their vessels, to decrease the upward curve towards the bow, and to bring it down nearer and nearer to the water, by fastening the planks together, end to end vertically. Thus by degrees the forward part of the vessel was immersed in its whole length, while the high stern preserved the advantage of rapid turning-power. Similarly when the vessel was used for purposes of attack, and the experience of charging an enemy's ship had been ensued, the adaptation of the bow for this purpose by prolonging it with projecting timbers would naturally suggest itself. The subsequent addition of a metal boss or pointed share, so as to inflict either a racking or piercing blow, was an obvious improvement to those whose business it was to plough the main. But the earliest type of artificial beak consisted simply in the prolongation of the keel-timber beyond the point at which the stem of the vessel was carried upwards.

That all these successive improvements in construction were due in the first place to the Egyptians is in a high degree probable. That they possessed a fleet and navigated the Mediterranean and Red Seas at a very early period is tolerably certain, even if the statement made by the priests to Herodotus (Book II, 102) concerning Sethi or Sethosis, that he navigated the Erythrean Sea or Indian Ocean in a fleet of ships of war, be fabulous. The legends of Danäus and Ægyptus connect Egyptian maritime enterprise with Greece, and in a remarkable passage Euripides (Troades 127) calls the ropes of the Greek vessels the "twisted teaching of Egypt."

Did the Phœnicians—the chief rivals of the Greeks in the carrying trade of the Mediterranean, and certainly their teachers in many things connected with ship building from very early times—did the Phœnicians in the first instance owe their knowledge of ship-building to Egypt, or was it of native growth? The earliest representations of Phœnician vessels that we have are of a much later date than those on Egyptian monuments, and are many stages in advance of them in

¹ See Plate XX.

form. They are in most respects similar to the early Greek types, which probably were borrowed from them. In these, both on coins and vases, we have the projecting beam for a beak, and a nearly straight bow and forecastle rising above it. The coin of Phaselis, a town of Lycia, of which we have here a drawing, and the figures of ships taken from Etruscan vases belong in all probability to a period between 500 and 600 B.C. They are the earliest that I have been fortunate enough to find.

The construction of beak here shown had in itself manifest disadvantages, which would soon make themselves felt, especially in a sea-way, when the force of the waves, as they tumbled home into the angle formed by the projecting spur, would soon be felt to impede the vessel's way, and to weary the rowers. And secondly, the weight of the projecting spur, especially if any metal was added to it, would be such as to involve a great strain on the fore part of the vessel, and further, being unsupported, it would in the shock of a concussion be liable to break off and endanger the safety of the ship.¹ We can fortunately trace the improvement that these considerations were sufficient to introduce. We have here a drawing from a coin of Samos, of which the date is given as about 490 B.C., in which the type has altered so far that the angle before noticed has been filled up by carrying on the waling-pieces that strengthen the hull of the vessel, and filling in on a gradually rising and receding curve, while from the point at which the upper waling-piece projects beyond the stem, the stem itself is carried up and forward in a bold line, so as to meet and divide the crests of the waves that might rise to that height. The whole structure marks an advance in the seafaring habits of the Greeks. The vessel thus constructed at the bows had a general resemblance to a pig's face, or, to speak more artistically, a boar's head; and it is interesting to find an historical incident connected with this matter. Herodotus tells us (Book III, 59) that the Samians who had risen against the tyrant Polycrates, when deserted by the Lacedæmonians, who had come to their aid, after making a raid on the island of Siphnos (and extracting one hundred talents of gold from the pockets of the inhabitants), settled in Cydonia, in Crete. There they flourished till they were beaten by the Æginetans in a sea fight, who, after the victory, cut off the bows of their ships, which were shaped like a boar's head, and placed them in the temple of Athene, in Ægina. The date of this battle is about 516 B.C. The coin is of somewhat later date, but it bears witness to an improvement in ship-building which is thus confirmed incidentally by Herodotus; for the circumstance would hardly have been mentioned if the shape had not been regarded as a novelty. That the Samians themselves claimed it as their own invention and were proud of it, may be inferred from the fact, that it became with them a national symbol, which survived on their coins even as late as the first century B.C. That it was recognized as such by the other Greeks, and especially by the jealous Athenians, may be gathered from the account given by Plutarch in his *Life of*

¹ Compare the instance given by Polybius, Book XVI, in the battle between Philip and the Rhodians.

Pericles, wherein he tells us that the Samians taken prisoners in the war which ensued upon the Samian revolt in 440 B.C., were branded by the Athenians with a "Samæna," as it was called, and explains, that the "Samæna" was a kind of ship invented by Polycrates, and was boar-faced in the curvature of prow (*ὄνυρπος τὸ σίμωμα*). If Polycrates was the inventor, it is interesting to notice that he was closely connected by friendship with Amasis, the Egyptian king; but, at the same time we may observe a development towards the same type upon coins of Phaselis, of a date quite as early as that which we have just noticed. I would also observe that an intermediate stage, showing the improvement begun, but not yet fully carried out, is discernible in the representations of some of the pirate vessels on the Etruscan vases.

I may mention at this point that, so far as we can gather from coins, the Persian and Greek types of beak seem here to part company. The coins of Pharnabazus of between 400-380 B.C. show, with very little modification, the type we have noticed in the earlier coin of Phaselis. Have we not here a clue to the maritime superiority of the Greeks over the Persians; progress in adaptation of means to ends on the one hand, prejudiced adherence to that which has led the way to success in past time on the other? A nation which cannot invent for itself, or, at any rate, assimilate the inventions of others, can never command the seas.

The Samian invention was not in any way a perfect one, but it was a real step in construction. That it was somewhat clumsy may be inferred from the remark that Plutarch makes that the "Samæna" was "low in the fore part and wide and hollow in the sides, making it "light and expeditions for sailing." The Athenians when their necessities had forced them to become a naval people, produced a vessel calculated for greater speed and ramming power. Fortunately, we have a representation of part of an Athenian trireme which enables us in some measure to judge of the progress made. The details of construction are clearer than in the representation given on coins. Here is a vessel built for speed, with lines as fine as those of a racing yacht.¹ The lowest waling-piece is carried out to a sharp point, which rises at some little height above the water, so that in smooth water it would always be clear. The entry is extremely sharp and fine, and gives at the first glance the idea of great speed. Such a vessel was well adapted for the Athenian tactics, which were based on rapidity and dexterity of movement. But the weak points are evident. A bow so constructed was capable of piercing the side of any vessel of the period to which it belonged; but as I have noticed in my previous lecture, the Corinthian shipwrights accurately gauged the force of impact with which a vessel of this build was capable of delivering a blow, and proceeded to strengthen the bows of their ships in such a way as to be able, not only to withstand the full force of such a blow, but to cripple the vessel that delivered it. This they effected by shortening the projecting prow and making the bows of their vessels much thicker and stronger, and at the same time by greatly strengthen-

¹ See Plate XX. Athenian galley with rowers.



PERSIAN.



PERSIA
B.C. 450.

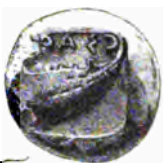


PHARNABAZUS
B.C. 400-380.

GRECIAN.



PHASELIS
B.C. 500.



SAMIAN
B.C. 494-76.



CIUS.
B.C. 330-310.



DEMTRIUS
B.C. 294-87.



ANTIGONUS
B.C. 292.



LEUCAS
B.C. 200.

ROMAN.



B.C. 350.



B.C. 320-270



B.C. 320-270



B.C. 216-199.



B.C. 38.



B.C. 91.



HADRIAN.

ing the catheads (*κῶτιδες*) that projected on either side of the bow. These catheads were constructed of heavy balks of timber, supported both from within and from without by wooden stays of about nine feet long, stretching from under them to the sides of the ship. These when the attack of the enemy's vessel was received "stem-on," which was, as we shall see hereafter, the form of attack which they took care to invite, broke up the forecastle and upper parts of the hull of the Athenian vessels so as to make them unseaworthy. The event, as we know, answered the calculations of the Corinthians, and from that moment the Athenian ceases to be the representative type of Greek war-vessel.

Yet the type itself is not wholly lost, and I think I may venture to say, though the subject is obscure, and I have not had all the opportunities that I could wish of following it out, that the subsequent Greek types oscillate between those of Athens and of Corinth. For it was only in close waters where there was not room for manœuvring at large, that the Corinthian build was certain of its advantage. In the open sea, speed was still indispensable for victory. Hence the question for the shipbuilder in the construction of the prow of his vessel was how to combine speed and strength. The invention of larger vessels with many banks of oars gave greater speed and greater force of impact. To meet this, heavier timbers were used in construction, and the waling-pieces became thicker and the bows of the vessel were not unfrequently armour-cased with bronze. The beak, no longer projecting so far as in the Attic trireme, was armed with three teeth so as to inflict a crushing blow without incurring the danger of being entangled in the enemy's vessel, a danger which often proved very real in action, as the following instances show:—In the course of the battle of Salamis, an Æginetan vessel rammed a Samothracian vessel. The Samothracian marines were expert in the use of the javelin, and while their own vessel was sinking, and before the Æginetan could clear himself of their wreck, they cleared his decks and boarded and took possession of his ship. Much later in a battle between the Illyrians, 229 B.C., with Acarnanians as their allies against the Achæans off Paxo (Polyb II, 10) the Illyrians used this stratagem against the great quadriremes and quinqueremes of their antagonists. They yoked their light vessels together by fours and exposed them sideways to the onward rush of the enemy, who thus became hampered with the wrecks of the innermost vessels, while the Illyrians from the outer vessels at once boarded and swept the decks, and in this way became masters of four quadriremes, and of one quinquereme with all its crew.

It would greatly exceed the limits of a single lecture if I were to delay much longer on the construction of the Greek prow. I will merely ask you, therefore, to notice the four instances that I have selected from coins, for casts of which I am indebted to the kindness of the authorities of the numismatic department at the British Museum. The first is a coin of Kius in Bithynia, which shows the influence of the Athenian type very clearly. The bows, however, are not so long or sharp as in the Attic trireme, and there is a sheer downwards in the main

waling-piece, which terminates in a trident beak. The timber of the second waling-piece is prolonged into a second spur (*προεμβόλιον*), and above again we see one if not two upper spurs. The *epotis* is very large and projecting, and shows the influence of the lesson of Syracuse taught a century earlier. The second and third coins are of about forty years later, and belong to the time of the successors of Alexander. The first, one of Demetrius Poliorcetes, represents, I think, the prow of one of his large vessels, for the construction of which he was justly renowned. The trident beak is here prefixed to a piece of timber, which has a straight run, and projects but little. The spurs above also are short. But the Corinthian type is manifest. There is an air of massive strength about the whole, which is wanting in the previous instance. The *epotis*, the forecastle, and the double timbers of the deck, all combine to give the idea of solidity and weight. The next instance, from a coin of Antigonus, is more ornate. I would remark only on the prominence of the beak and upper spurs, and the difference of the angle at which the stem is carried upwards as compared with the previous instance. The fourth and last Greek coin is of Leucas, now Sta. Maura, an ancient colony of Corinth. It is of a date when Greek independence was drawing nigh to its extinction, and the Romans were already masters of the sea. Compare this type with that of the Athenian of two centuries before, and the difference of build is at once apparent.

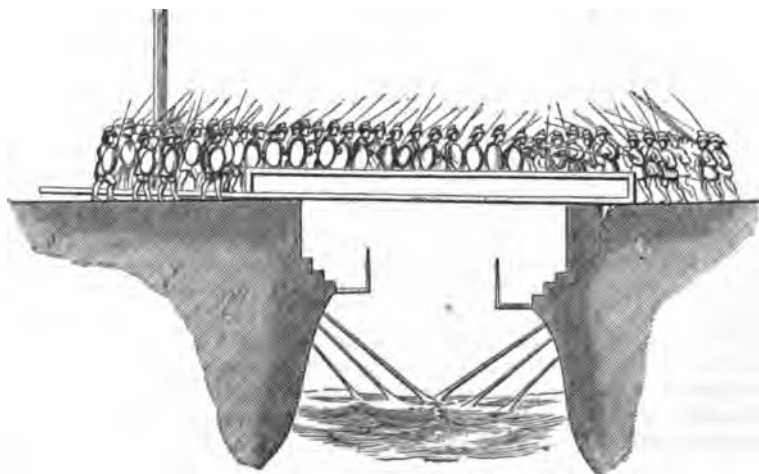
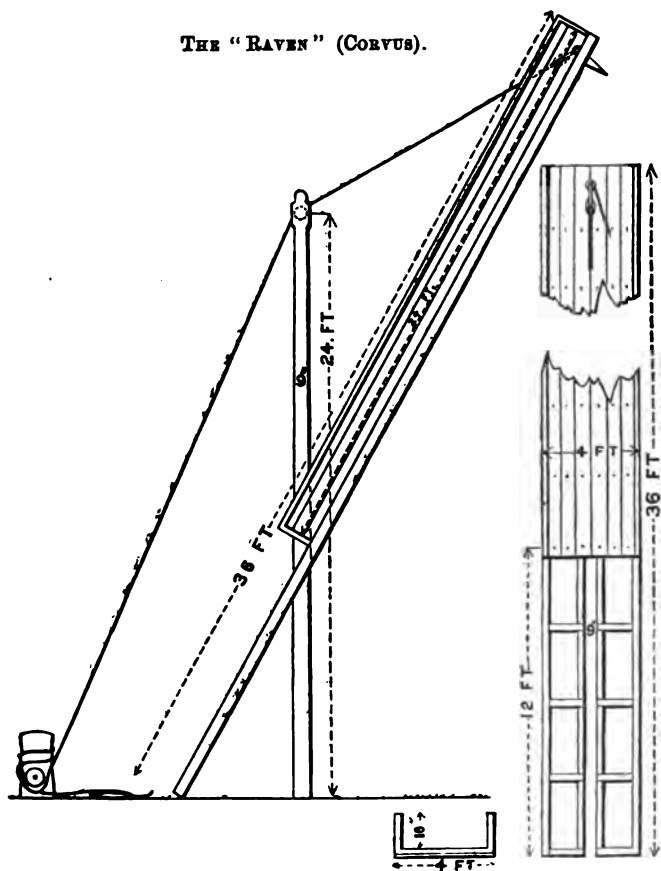
Let us now pass from Greek to Roman prows, of which I have selected for comparison seven instances from coins in the British Museum. Of these, three belong to a period previous to the first Punic war; and I mention this, as it has been often too readily assumed that the Romans had never engaged at all in maritime warfare before that time. The treaty however with Carthage, which was made in the time of the kings, proves that even as early as the fifth and sixth centuries they were familiar with the sea. The appointment of *Duumviri Navales*, officers charged with the duty of equipping and repairing the fleet, an office which existed before the year 311 B.C. (as we find the right of election of these officers then transferred to the people)—is in itself sufficient evidence of the existence of a fleet. The coin, of which we have here a drawing, dates from the year 350 B.C.; and so far as can be distinguished from the rough outlines which it presents, is of a somewhat different type from the Greek, much more rude and bluff, the stem carried forward at a sharper angle to the water, and terminated in a curved acrostolion of much shorter and stouter build than those observed in the Greek types. If the Romans did borrow from the Greek cities of Italy in the matter of naval construction, we may be sure that they departed from their models freely to suit their own ideas of practical utility. In the two next instances, which belong to the half century preceding the first Punic War, we have two varieties of construction belonging to the same period. In the one, the beak is depressed, and the timbers that support it are of less thickness in themselves, but compacted together by means of cross-pieces. It seems to represent an attempt at a construction which should save weight without sacrificing strength. The

other is more decidedly Greek in type, showing a single piece of timber carried out straight into the trident beak, and similarly a straight single piece supporting the upper spur (προεμβόλιον.) It is probable that these vessels were triremes. They may have belonged to that fleet which was forbidden by the treaty contracted with Tarentum about the year 303 B.C. to sail beyond the Lacinian Promontory, or to the fleet of ten Cataphract ships which, under L. Cornelius in 282 B.C., violated that treaty, and being attacked by the Tarentines, suffered a loss of four vessels sunk and one captured. The long struggle, however, of the Samnite wars had engrossed the attention of the Romans almost completely in military matters; and the very terms of the treaty, the infraction of which met with such signal chastisement, show that their efforts by sea were of secondary consideration to them. The war with Pyrrhus succeeded, and at the opening of the first Punic war in 264 B.C. Rome was practically without a fleet. Her armies marched by land to Rhegium, and thence, in the absence of the Carthaginian fleet, crossed the narrow strait by such transports as they could collect from their Greek subject cities. It was not till the Carthaginian fleet, ravaging the coast of Italy, brought home to them the real conditions of the contest upon which they had entered, that the Romans turned their attention in real earnest to the sea. Hitherto the conquest of Italy had occupied their thoughts, and Italy was to won by land. But the first Punic war was the commencement of a struggle for a wider empire, the empire of the ancient world. No empire is ever won, no, nor ever maintained, without the mastery of the highways that are the means of communication; and the first step to the empire of the ancient world meant the command of the Mediterranean. I am therefore tempted here to dwell upon the construction of the Roman fleet in the first Punic war as an event unparalleled in history, and surely one of the gravest significance, if by a sudden effort a purely military nation could take to the sea, and with the aid of a new mechanical contrivance, in a few years utterly crush and practically extinguish, not only the fleets of the first maritime power in the world, but the very spirit which made those fleets formidable. Hannibal may ravage Italy, but he has reached Italy by land and not by sea. He may march to the very walls of Rome, but no Carthaginian fleet dares to support him at the mouth of the Tiber. We hear of one or two skirmishes, but of no great naval action. It is not too much to say that from the close of the first Punic war to the days of Ricimer, no foreign nation dared to contend against the maritime power of Rome. Actium indeed decides the fate of the world, but Actium is Rome arrayed against herself.

The transference of maritime dominion is closely connected with the subject immediately under our consideration, the use of the ram. We have already seen how, by the improvement in the construction of the bows of their vessels, the Corinthians and Syracusans were able to paralyse the superior nautical skill of the Athenian. Brute force, thickness of timber and armour-plating, patient attention to detail, and a steady perception of the end in view, prevailed over *élan* and seamanship and quickness of manœuvring

power. The same lesson is now taught again upon a larger scale, and with far more momentous results to the world. The Romans had no fleet,—perhaps a few triremes, but nothing that could keep the sea against the Carthaginian quinqueremes, ships of five banks of oars, which were the line-of-battle ships of the day. By chance, in the year 260, one of the Carthaginian vessels of this rate was driven ashore and captured by the Romans. With the practical sagacity and unswerving energy of purpose which distinguished them, they determined to construct a fleet upon this model. The timber was felled, the shipwrights set to work, and, within two months of the time when the trees were standing in the woods, a fleet of a hundred vessels, each 168 feet long and of 534 tons measurement, had been constructed. Not only this, but the future crews meanwhile were placed on framework set up upon the land, and there and then practised in the motions of rowing to the voice of the *keleustes*. When all was nearly ready, the Admiral, Cn. Cornelius, set sail in advance with seventeen ships, leaving orders for the fleet to follow. He sailed, and within a few days was taken, ships and all, by the Carthaginians. Meantime the rest of the fleet was under way. The ships were badly built, and terribly slow, as might have been expected. Defeat was a certainty; but some ingenious spirit suggested to Duillius, who now assumed command, the construction of a novel engine of warfare, destined to render useless the rams of the enemy. This contrivance was called the “raven” (*corvus*). As described by Polybius, it was of the following character: at the prow of each vessel was fixed a mast 24 feet high, 9 inches in diameter. This had a pulley on the top. Attached to this mast was a long ladder-shaped construction, with planks nailed across it, 4 feet wide and 36 feet long, with an oblong slit in the cross-planking in the first 12 feet of the ladder. This long ladder or gangway had a balustrade about the height of a man's knee running the whole length of each side. At the end was fastened an iron claw, which Polybius compares to the knocker of a door, only sharpened into a point. This had a ring on the top of it, so that the whole was, he says, not unlike the long trays used by bakers in their ovens. To this ring was attached the rope by which, as a ship came up for the purpose of ramming, aided by the pulley on the top of the mast, they let the ladder, which thus formed a boarding bridge, fall on to the deck of the enemy's ship, sometimes over the prow and sometimes slewing it round when the attack was on one side. The weight of the boarding bridge falling drove the sharp iron spike into the planks of the enemy's deck, and so bound the two vessels together; then the marines, if the vessel was prow to prow, rushed two abreast over the bridge; if alongside, boarded from all parts together. Once the trained soldiers of Rome had gained the deck of a Carthaginian vessel, and there was but little chance for her. The “mere rabble” (as Niebuhr calls them) of an African crew could do nothing to withstand such a foe, for the crew of the Roman quinquereme seems to have consisted of 120 soldiers, in addition to 300 rowers and seamen, a far larger proportion of marines than that employed in the Greek vessels.

THE "RAVEN" (CORVUS).



The result of the first naval engagement proved clearly the sound good sense of Duillius in adopting the new invention proposed to him. Unless he could reduce the conflict to something like land-fighting, there was no chance whatever for him, considering the quality of his ships and his crews as compared with those of the enemy. The "corvus" provided him with the means of using his real strength. The two fleets met at Mylæ, the modern Melazzo, not far from the Straits of Messina. The Carthaginians advanced with a fleet of 130 vessels, full of confidence in themselves and contempt for the crews which had learnt to row on dry land, but somewhat puzzled at the masts and long crane-like machines swinging at the bows of the Roman quinqueremes. However, the advanced squadron of 30 ships at once charged, and were almost immediately grappled, and boarded, and taken, including the Admiral's flag-ship. After a short time the remainder of the fleet, finding themselves unable to cope with this novel engine, which robbed them of all the natural fruits of their seamanship and skill, turned and fled, with a loss of about 50 ships, 3,000 killed, and 7,000 prisoners. This victory was the presage of doom to Carthage and the prelude of maritime dominion to Rome. The ram henceforth, though still formidable, had no longer the first place as a weapon of attack. It may be for this reason that in the coin of 216 B.C., of which we have here a drawing, we see it much less projecting, and apparently less strongly supported. Duillius still enjoys well-merited renown, and in the present year has had his name revived in an Italian ironclad. In his lifetime he was even more fortunate. He alone of all Romans was allowed the unprecedented honour of having a piper to play before him whenever he went out to dinner, and torches to light him as he returned.

In the later Roman coins the representation of vessels of war seems to me to evince on the part of the artists a want of interest in naval matters. The types are either grotesque, as in the coin of 91 B.C., or as in the two last instances (one of B.C. 38 and the other of the Emperor Hadrian a century and a half later), indistinct, and fail to convey any instruction as to the build. In fact, if anything, we seem to have reverted back to a type resembling the old Persian type, which I have placed side by side for comparison. We may notice also, that in these later Roman coins we have the sail represented, which is not, so far as I have observed, ever found in the case of a Greek man-of-war. In the eyes of a Greek, the sail was a symbol rather of flight than of fighting.

We have seen how the invention of the "corvus" paralysed the use of the ram. It is interesting to notice how the Athenians, in their distress in the great harbour of Syracuse, where their ramming tactics were rendered useless by the want of space, and by the Corinthian build of bow, at once perceived that boarding tactics were the only alternative left to them by which the victory might possibly be gained. To this end they devised an "iron hand" or grappling iron attached to a chain which was to be thrown on board the enemy's vessels and so make them fast. Against this danger the Syracusans provided, by covering their decks with greased hides, so that the grappling iron

slipped off without gaining a hold. The weight of the *corvus* as it fell prevented any such device availing against its utility.

Of the other weapons of offence used in naval warfare the most important was the "dolphin," a heavy mass of metal, used for the purpose of sinking an enemy's ship. It was hoisted by means of the yard-arm, which was swung round over the enemy when he came to close quarters. Then the weight was suddenly let fall upon his deck, which it was sufficient to penetrate, even if it did not break right through the bottom of the ship and sink her. We hear also of great beams that swinging from the masts were used as rams against the side, or slung so as to sweep the decks of the foe.

The graphic account given by Cæsar of the fight of his fleet with the Veneti, on the coast of Gaul, introduces us to the *Falces*, great spars with curved steel heads like a reaper's sickle, with which the cordage of the barbarians was cut, and their vessels which were too unwieldy for rowing thus rendered helpless. In later days we have also the counterpart of modern artillery, the *Siphons*, from which the terrible Greek fire was launched, rocket fashion, against the enemy. Some of these seem to have been of a very large calibre, others, again, small enough to be carried by a single man.

The sketch will not be complete unless we mention the *Turres*, towers, the "*alta propugnacula*" of Horace, erected at the bow and stern, and sometimes, if we are to credit the representations on the Column of Trajan, amidships. These were much in vogue among the Romans, to whose tactics they were subservient, giving a vantage height from which the heavy *pilum* or javelin could be thrown down upon the enemy's deck. Agrippa is credited by Servius with an invention by which these towers could be run up suddenly on coming into action, and were so adapted for the purpose of taking the enemy by surprise.

We may at this point quit the consideration of the armament of the ancient man-of-war and pass to the subject of tactics, properly so called. And first, with regard to the handling of a single vessel, much in old time, as now, depended on readiness and fertility of resource in the officers, and especially in the trierarch, or captain. The skill of the helmsman, the inspiring voice of the *keleustes*, the alertness of the *stoicharchs*, or captains of the banks of oars, were scarcely less important; but above all, upon the training and condition of the oarsmen, upon the efficiency of the motive power of the vessel, depended the chances of victory in single combat. It was in the perpetual training and hardening, under circumstances in which real danger supplied the motive for energetic action, that the free crews of Athens and her allies attained to that excellence which secured to her the sovereignty of the *Ægean* for so many years. It was the want of training and the refusal to endure hardships that caused the Ionians to be disastrously defeated by the Persians at the battle of Lade, and delayed their chances of freedom for fourteen years. The story of Dionysius the Phocæan is interesting and instructive. There, off the shore of the island of Lade, now a hill in the flat marshy plain of the *Mæander*, in the year 494 B.C., four years before Marathon, was drawn up the combined fleet of the Ionians then in revolt against the great king. They

covered Miletus, their base of operations, and lay facing the north. The Milesians, with 80 ships, held the right wing, the place of honour, and next to them the Chians with 100 ships, each with 40 picked marines on board. Next were the Lesbians, with 70, then 43 from the various isles, and last the Samians with 60 on the left. Among the 43 were 3 from Phocæa with Dionysius in command, an energetic and able man. In the council his voice was heard telling some home truths, that without practice they could not be perfect, and that with a fleet of 353 sail as against 600 of the enemy, they wanted all the perfection to which they could attain. His advice prevailed. He was placed in command of the combined fleet. Each day he led them out in column, in order to practice the rowers in manœuvring for some hours, and for the rest of the day he kept the vessels at anchor, and would not allow the crews to land. This last measure, we may here notice, was a most salutary precaution when the enemy were anywhere near at hand, as the crews, when the vessels were drawn up, were wont to stray away and so to render a sudden embarkation a scene of the utmost confusion. The neglect of this precaution was the cause of the utter destruction by Lysander of the Athenian fleet at Ægospotami, of the final blow that laid the hopes of Athens in the dust. The Ionians, however, were made of softer material than their Athenian kinsmen. For seven days they endured the discipline of Dionysius, but then complaints of fatigue and sickness became rife, and the insubordination reached such a pitch that the Admiral was deposed from his command, and the crews had their own way and remained on shore. But a few days afterwards the Persian fleet of 600 sail appeared. The natural result followed. Divided counsels had fostered treachery. They hurried out in column line ahead, and had just time to form up abreast, when the Samians, all but ten, hoisted their sails and left the line. The rest, with the exception of the Chians, who fought bravely, and a few others, among whom was the brave Dionysius, followed their example. Had they persevered in their training, the events of a few years afterwards showed that, although outnumbered, they might have been quite a match for the seamen of the East.

Xenophon, in his short treatise on the Athenian Republic, tells us that the seafaring habits of the Athenians were such that every one knew how to handle an oar, and that the crew of a trireme could be got together with ease at once. In his *Hellenics* (Book VI), he gives a graphic account of the stern training to which the crews were subjected by Iphicrates, the Athenian Admiral, with a view to getting them into condition, and so increasing the speed of his ships. He left, he tells us, all his mainsails at home, and setting the smaller sails (*ἀκάτεια*) very seldom, used the oar for the entire voyage. Whenever the fleet was nearing the place selected for disembarkation for breakfast or dinner, his custom was to put out further to sea. At a given signal the whole fleet came about and the vessels raced to shore. The crews of those that arrived first had choice of ground and water, and were able to get their meals in comfort, while the laggards fared but ill. By such devices and by constantly practising the formation of different orders of sailing while on

his way, he brought his crews to a high state of efficiency without losing time (which was important) in his voyage to Corcyra. His diligence and forethought, which are warmly praised by Xenophon, were rewarded by success.

The skill of the captain of each vessel in the manœuvres of an ancient fleet must have been taxed in no ordinary degree. The number of vessels generally sailing in company rendered the danger of collision considerable. Attention to signals from the admiral's flagship was constantly required. The captain was responsible for everything that occurred in connection with his vessel, and the story of the unfortunate Scylax, who was lashed to a porthole, with his head outside and his body inside his vessel, shows that punishment was sometimes summary as well as severe.

The exploit of Artemisia, the famous Halicarnassian Queen, at Salamis, is a type of the ready daring in handling a vessel which the Greeks so greatly admired. Hotly pursued out of the rout of Salamis by an Attic ship, with friends in front of her and enemies behind, she had the unscrupulous cleverness to run down a Calyndian vessel belonging to the King's fleet, which sank with all hands. The Athenian thinking, when he saw the exploit, that he was pursuing one of his own side, gave up the chase. Xerxes, who witnessed the same, gave her credit for sinking an enemy's ship, and exclaimed that "the men in his fleet had become women and the women men."

More legitimate was the clever manœuvre of Phormion's captain off Naupactus. The last of the eleven ships that had escaped in the flight from vastly superior forces, he was hotly pressed by a Leucadian vessel. Seeing, as he approached the roadstead, a merchantman lying at anchor some way out, he made straight for her, and turning sharply behind and round her, rammed the Leucadian just as she came up, and sank her, and by this daring exploit, not only saved the remnants of the Attic squadron, but struck the Lacedæmonians with such fear that they stopped rowing, and were ignominiously defeated by a force only half their number.

A captain's readiness required to be well seconded by his officers, and especially by the κυβερνήτης, or helmsman, who, next to the captain, was the most important person in the ship. The κυβερνήτης was responsible for the navigation of the vessel. He was the navigating lieutenant as well as steersman. It was requisite that he should be weatherwise as well as waterwise, if one may coin such a word. The advice of the κυβερνήται seems to have been constantly asked by the admirals in command. We have instances when it was taken and proved of the greatest use, as in the case of Ariston, at Syracuse, who bade the admirals have food brought down to the shore for the crews at noon, so that they might get their dinners and then embark suddenly and attack the Athenians, who had returned to their naval camp thinking that work was over for the day. On the other hand, it would have been well for the brave Callicratidas, if he had listened to the advice of Hermon, the Megarian, his κυβερνήτης, who realised the value of the odds at Arginusæ, instead of making the gallant rejoinder "that Sparta would be no great loser if he died, but that it was base to

"run away." It was not his personal safety or reputation, but the proper use of the fleet under his command that was the true issue upon which his judgment should have been exercised. The neglect of the advice of experienced κυβερνήται was, on another occasion, even more severely punished, when the Romans, in all the confidence of the victory of Mylæ, had begun to fancy that Italia ruled the waves, and Marcus Æmilius and Servius Fulvius in the year 255 B.C., took the sea with a magnificent fleet of 364 vessels, defeated the Carthaginians, and rescued the remains of the ill-fated Army of Regulus. Then, returning triumphant in the autumn, in defiance of the repeated expostulations of the κυβερνήται they persisted in sailing, though Orion was already showing his great shoulder above the wave, along the southern coast of Sicily. The storm fell upon them, and of the whole fleet, but 80 hulls survived the greatest naval disaster, that the world has ever seen, when 106,500 men and 151,656 tons measurement of shipping were at one and the same time sacrificed to blind presumption and proud ignorance.

Of the tactics of a single vessel in action, when the ram was the chief weapon of offence, it is necessary to notice, first, the ἐμβολή or impact on the enemy's side or quarter, to effect which skilfully and quickly, was regarded as the acme of success; next, the προσβολή, or direct attack, stem on, which was thought unseamanlike by the Athenians, but adopted, without hesitation, by the Corinthians. It was also of great importance that a crew should be able to back water (ἀνακροῖν) with strength and in time. The diagrams, which face page 535 of the volume of the Journal of this Institution for the year 1874, of some experiments carried on at Cronstadt, by the Russians, with steam launches, might be taken, *mutatis mutandis*, as fairly representing the kind of war-dance that two ancient triremes would execute around each other in a prolonged effort to ram and not be rammed. We do not often hear of vessels of the same rate sweeping away each others banks of oars, for this reason, I suppose, that the projecting parodus, as shown in the model, afforded a protection to them, owing to the angle at which they were worked.

We have seen with what rapidity an ancient fleet was constructed, in the case of the Romans, in the first Punic war. The Greeks, however, appear to have taken longer to build their vessels, the construction as well as the repair of which was costly. Upon this point we have ample details, as regards Athens, but time forbids us to enter upon it here.

At the end of my last lecture, I ventured to describe the fitting-out and departure of the fleet of triremes that carried the Athenian expedition to Syracuse. No mention was then made of the various smaller craft that accompanied the movements of an ancient fleet. But, besides the line-of-battle ships, as we may call them, there were many lighter vessels used as despatch boats, as tenders to the flag-ship, as pilot and look-out vessels. Such vessels did not keep out of action when the fleet engaged, but were used to hamper the enemy's oars by running under his counter, sometimes even to ram him when already engaged, or to divert his attention in various ways. And when the

size of the men-of-war had been so greatly increased that failures in their motive power were more frequent, and more disastrous when they occurred, the use of the smaller vessels was more and more fully recognized, till, at the battle of Actium, the light Liburnians bore away the palm, and the "tall bulwarks of ships" became a thing of the past to the ancient world.

Foremost in dignity, and generally in size and speed, was the Admiral's flag-ship, known by its pennant or badge (*παράσημον*). It carried the *ναύαρχος* or Admiral. His second in command was called *ἐπιστολεύς*. From the admiral's flag-ship the signals were given and probably repeated by all the ships of the fleet. These seem to have been generally made by flags, the red *sagum* or cloak with the Romans being hoisted as a signal for action. What the principle of their signal-code was we cannot now discover, but it must have been sufficiently elaborate, to judge by the indications that we have remaining.

It is interesting to notice that the raising of a shield appears, upon two or three occasions, to have been employed as a signal, suggestive of the question whether the flashing of reflected rays may not have been employed thus early as a means of communication. The Alcmaeonidae were accused of having, in this way, signalled to the Persians after Marathon. It was thus that Lysander turned the course of his fleet for *Ægospotami*. It was by lifting up a golden shield that Demetrius Poliorcetes gave the order to join battle. We have also an elaborate code of fire-signals, given by Polybius, for use on land, by the employment of which any word could be spelt out.

An ancient fleet as a rule did not go far from land, and generally the crews went on shore for meals, and for the night. The vessels were moored stern to the shore, or drawn up, according as the coast permitted. Herodotus, speaking of the Persian fleet which conveyed Datis and Artaphernes to Marathon, naively remarks that they did not follow the usual *straight* course along the shore round by the Hellespont, but came across the *Ægean*.

In many instances, very frequently in the Peloponnesian war, the fleets were accompanied by land forces marching along the shore, and often when the vessels were driven ashore, the soldiers came down to the water's edge to rescue a friend or complete an enemy's disaster. Who that has read it, can ever forget the graphic picture drawn by Thucydides of the actions at Pylos, when, by a wonderful inversion of the natural order of things, Lacedaemonians were fighting from the sea, which was not their element, against Athenians on Laconian land, and, when a few days later, after the defeat of the Lacedaemonian fleet in the bay, the land forces of the Lacedaemonians engaged in a naval action from the land, while the Athenians were land-fighting, as he calls it, from their ships? Not less stirring is the account of the gallant rescue of part of Phormion's fleet by the devoted Messenians of Naupactus, whose love for their deliverers the Athenians, was increased and quickened by their fierce hatred of their former masters.

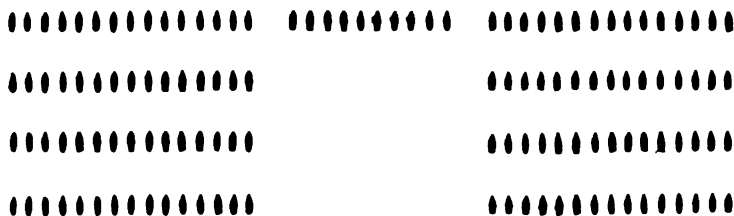
In preparing for action, the chief object was to lighten the vessel as much as possible. Hence the great sails and masts

were put on shore, and everything that could be spared as not wanted for immediate use. This practice necessitated the formation of naval camps as immediate bases of operation. A surprise and seizure of such depôts was frequently the object of a victorious, or even of part of a defeated fleet. Thus, during the battle of Sybota, the Corcyrean left wing defeats the Corinthian right, pursues it, and burns the camp of the latter, while, all the while, their own centre and right were being disastrously defeated. Similarly, after the battle of Ægospotami, Cœnon, escaping with nine ships, lands at the headland of Lampsacus, and carries off all the mainsails of the victorious Lysander. The practice of fighting near the land was not unattended with danger. Proximity to the shore not unfrequently damaged the Peloponnesian fleets, the crews of which were more happy on *terra firma* than on the less stable element, and were thus apt to begin backing when they should have been advancing. The Athenians, as we have seen, preferred mere open water; and the description of Phormion's manœuvres, by which he wished to draw the Lacedæmonian Admiral outside the Straits of Rhium, at the mouth of the Corinthian Gulf, is well known to the readers of Thucydides or Grote.

The orders of battle adopted by the ancient fleets were, in the earlier times, extremely simple. The fleet sailed generally in a column or columns of divisions line ahead (*ἐνὶ κέρας*). When the enemy was sighted, these moved into column line abreast, generally in single line (*τάξις* or *παράταξις*). Fleets composed of an extraordinary number of vessels were drawn up in several lines abreast; that of Xerxes at Salamis, for instance, in six. The crescent formation was not unusual in the case of a superior force, or one that had its wings protected by the coast. The centre thus refused, the wings could close in and envelope the enemy. It was in this formation that the Persians sailed to their first defeat at Artemisium. And in the same, the Lacedæmonian Cnemus, tried, off the Achæan Panormus, to draw into action the wary Phormion. The circle was also occasionally adopted, as by the Greeks at Artemisium on the occasion above mentioned, when, though cooped up in a small space, and face to face at close quarters with the foe, on the second signal they fell bravely to work, and before nightfall had taken thirty of the enemy's ships. The circular formation, however, proved disastrous to the Corinthian fleet, when, fearing the swift Athenian tactics, they adopted it at the mouth of the Corinthian Gulf, thinking that by showing a front of sharp prows on every side, with their five best galleys in the centre ready to help in any quarter that might be pressed, they would be impregnable. They had not yet altered their build, or the result might perhaps have been different. As it happened, that excellent seaman Phormion, the Cochrane of Athens, when he saw their formation, at once concluded that they could not remain firm like infantry on land, which was what they seemed to think possible, but that after a little, their ships would come into collision one with another, especially if the breeze, as was usual in the morning, should spring up and blow from the Gulf. He, therefore, gave orders not to

attack, but kept his fleet in single line ahead, moving round and round, ever closer and closer, till he saw them in confusion. The breeze sprang up with a roughish swell from the eastward, and the circle was already in trouble, the oars interlaced, the crews shouting, and all order lost. The moment had arrived, the signal was given, and the Athenians attacked. The Corinthian Admiral's ship was sunk at the first onset, the others showed no fight. A few escaped to Patræ and Dymæ, the rest were crippled or taken in pursuit.

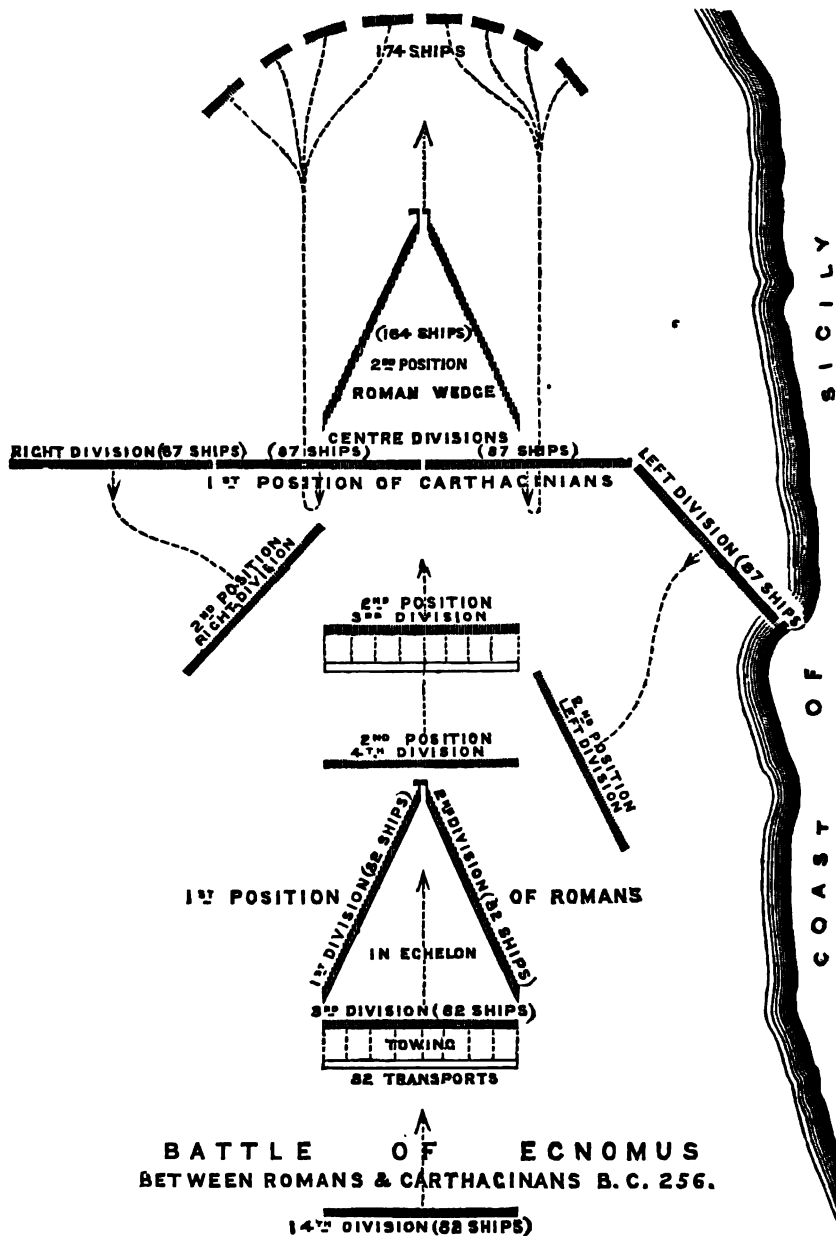
We have in Xenophon a minute account of another formation adopted by the Athenians at the battle of Arginusæ, which he calls *ἐνὶ φάλαγγος*, which we may describe as two columns of divisions in four lines abreast, each consisting of fifteen ships, with an interval between the first lines of the two divisions filled by ten ships in single line abreast. It was in this formation that the Athenians met the brave Callicratidas, who attacked in single column line abreast.



Athenian Order of Battle at Arginusæ.

One other formation remains to be mentioned, as adopted by the Romans in the battle of Ecnomus, near Heraclea, in Sicily, which may be called the wedge (*Cuneus*). It is described by Polybius in his first book. The Roman Admirals Marcus Atilius Regulus and Lucius Manlius sailed parallel to each other in two *Hexeres* six-banked galleys. Their fleet followed in four divisions, arranged in the following order:—The first and second divisions in rear of the two flag-ships in single column line ahead, but so disposed that each ship was in *echelon* outwards from the front, thus forming two sides of a triangle, the base of which was filled up by the third division in column line abreast towing the transports, and in rear of this, the fourth division in a similar formation for their protection. They thus hoped to present an unbroken front to the Carthaginians, their superiors in speed and in power of manœuvring. The Carthaginian Hamilcar, to oppose them, having divided his fleet likewise into four divisions, drew up three of these in line abreast at right angles to the course of the Roman fleet. The fourth he disposed *en potence* on his left towards the land. His object was not only to enclose the wedge, but if possible to draw the two first divisions of the Roman fleet away from the other two, which were hampered with the transports. To effect this, the Carthaginian centre, as soon as the enemy approached, turned in pretended flight and was hotly pursued by the Romans. As soon as Hamilcar judged that the two sides of the wedge were drawn sufficiently far away from its base, at a given signal, the Carthaginians turned fiercely on their pursuers.

2ND POSITION, CARTHAGINIAN CENTRE.



They found, however, that the wedge formation was still unbroken in pursuit, so far as the two sides were concerned, and that it was, as the Roman Admirals had judged, admirably suited for defence, each vessel facing outward with her next neighbour, ready to assist her if rammed or in any other trouble. Still, if Hamilcar's orders had been obeyed by the commanders of his first and fourth divisions, and these had turned upon the open rear of the Roman wedge now separated from its base, the victory was assured. These, however, seeing the third and fourth divisions with the transports, and thinking to have an easy victory, engaged with them respectively. Thus three naval actions were going on at one time, in which not less than 680 ships-of-war were taking part. In the end, the Romans were victorious, the terrible "*corvus*" showing itself still, as before, superior to the ram. The Carthaginian defeat has its lessons for commanders of divisions or detached squadrons, and its moral is, "Obey orders." The wedge formation in *echelon* has something in common with the *peloton* formation of modern days.

Such were the various orders of battle, so far as I have been able to discover them, but these by themselves do not exhaust the subject of the tactics of a fleet. For the purpose of attack with the ram two manœuvres were commonly employed, named respectively *dieplus* and *periplus*. In the *dieplus*, which accurately rendered, means "the sailing out through," the vessels of the attacking fleet passed through the intervals of an enemy's line, doing what damage was possible by sweeping off oars, and by a fire of missiles *en passant*, and then turning with all speed sought to ram the enemy before he could come completely about. In the *periplus*, a portion of the attacking fleet sheered out of line, and sought to wheel in succession on to the flank of the foe. But for this manœuvre open water was necessary. In a land-locked bay or harbour, such as that of Syracuse, it could not be employed. Against the *dieplus*, the practice of sailing in double or triple, or even quadruple lines, was employed, but there was great danger in such formation unless the crews were most perfectly trained, first, because the increase of depth naturally contracted the front, and so laid the fleet open to flank-attacks; and secondly and chiefly, because, as happened to the Persians at Salamis, the second line was apt to encroach upon the first, and the third upon the second, and the difficulty was increased tenfold if the leading line retired in disorder on the second while it was advancing. In fact, for the success of any such combination, the most perfect discipline and silence on the part of the crew was absolutely necessary. The history of the changes in ancient naval tactics is sufficiently well defined. It would not be difficult to trace their development and decline from Dionysius the Phocæan to Vipsanius Agrippa, from Lade to Actium. But time fails us, and I would fain ere I conclude speak briefly of the causes which contributed to the decline of the ancient marine.

To ourselves, who are familiar with the all-potent steam, slave of the wheel or the screw, it might at first sight seem immaterial whether the crews, which were the motive power of the ancient man-of-war, were bond or free, so long as they had the requisite strength

and training. But as with the Venetians in later days, so with the ancients, the employment of slave labour at the oar tended both directly and indirectly to impair the efficiency of the naval service. There were, however, many causes that led to the practice of employing forced labour. First, the absolute discomfort of the crew in a Cataphract ship must have been extreme. In a hot climate, with but very little ventilation, it must have been exceedingly trying to take part in a laborious mechanical toil with perhaps some hundred or two of human beings stark naked, and packed so closely that there was not room, as Cicero says, for even *one* man more. The heat, the smells, the toil, must have been terrible; to any one undergoing it against his will so terrible as to suggest that even death itself were better than such drudgery. A dull dead feeling of despair must have crept over many a crew in such a case, and though the lash might keep them going under ordinary circumstances, such spirits could not be relied upon in times of emergency.

In proportion as the size of the vessel was enlarged, so the number of the crew was increased, and we have seen that it is probable that in the larger vessels, the ordinary space allowed per man for the rowers was reduced from 8 to 7 square feet. The conditions of the service were therefore rendered worse and not better by the advance in naval architecture.

Besides the question of discomfort, the actual danger was very great. The crews were liable at any moment to be drowned or burnt, or in the case of defeat, butchered by the victors, perhaps, as at Sybota, deliberately in cold blood. Conceive the moment of conflict and its horrors, when the sharp-pointed beak came crashing through the timbers, smashing them right and left along with the helpless mass of human beings, while the water followed swift upon the blow, perhaps just giving time to the Thranites to swarm up upon the deck, while the helpless Thalamites were drowned at once.

It is not to be wondered at that such a service should become unpopular, and that in the deficiency of free labour, which became all the more costly as the conditions under which it was to be employed became less inviting, recourse should have been had to slaves. Hence, perhaps the glory of the trireme has been greater than that of the larger vessels that superseded it, for the great feats which it performed were wrought by the hands of free men fighting for their country or its allies, or else voluntarily giving their services for pay. At the time of the Peloponnesian war the pay of an ordinary oarsman, I may mention here, was three obols a day, increased towards the end of the war to four obols, or a little more than sixpence of our money. The pay of the Thranites was higher, their services being valued at a drachm, or about ninepence per diem. Raising the pay of seamen was a favourite expedient during hostilities, with a view to crippling the resources of the enemy, by inducing his crews to desert, a practice not without its parallel in modern times. For no purpose was Persian gold more greedily sought after, except perhaps for bribing the chiefs themselves.

The Romans manned their fleets by levies from the lowest orders,

and by forced service of their allies. Still, the greater proportion of the labour employed by them was that of slaves, contributed by free men as substitutes, and it is this fact which perhaps explains the equanimity with which they endured the huge waste of human life which their fleets involved. Hence among the Romans the service on board ship was most unpopular, and we are not surprised to find in the pages of Tacitus the discontent of the *Classarii* recorded, who wished to be transferred to a more honourable calling "in spem honorioris militiæ." They felt they were despised by their brethren of the legions, and wished to quit a service which herded them with slaves and offered them danger without hope of distinction. Such were some of the influences which led to the decay of the ancient navies, and at the same time to the obscurity in which the details concerning them are involved. As a rule, the historians (who take endless pains in minutely narrating military operations, for I must except Polybius and Cæsar) pass over naval affairs with but slight notice, or at the best give slight sketches of such matters in general terms.

It remains for us to institute a short comparison between ancient and modern fleets as regards their tonnage and manning. In this I rely upon the calculations of Graser, for I have not yet had time to work them out for myself. He compares the Attic fleet of the year 330 B.C. with the Russian fleet in the Crimea in the year 1854. The tonnage of this he gives at 72,000 tons; the Attic fleet, consisting of 411 vessels, he computes at 98,085 tons. During the next five years the Attic fleet had been increased to 103,577 tons measurement. The present tonnage of the British navy is, I believe, about 300,000 tons, of the French about 200,000 tons in round numbers. The fleet of Xerxes, which we are assured on good authority consisted of 1,207 triremes, must have had, upon Graser's basis, 280,627 tons measurement. The great fleet of the Romans at Ecnomus, consisting of 364 quinqueremes, represents shipping to the extent of 193,376 tons. These numbers may not be exactly accurate, but they assist us to realise the vast scale upon which these ancient navies were constructed, and forbid us to underrate them.

The multitude of men employed exceeds by far that of modern times. The crews of Xerxes' fleet all told, are estimated at upwards of 340,000 men. The Attic navy of the time of Demosthenes required upwards of 90,000 men for its service. The Roman fleets in the first Punic war carried in some instances nearly 120,000 men.

The thought of the employment of these vast forces can hardly fail to bring home to us the awful conditions of ancient naval service. What a terrible sight must have been that storm to which I have already alluded, when the coast of Sicily for miles was strewn with the bodies of the dead and with the fragments of the perished fleet! What a spectacle, again, must have been that great Battle of Ecnomus, when from the Sicilian coast might have been seen those two great fleets, the mighty Roman wedge and the long bent line of the Carthaginians, approaching each other for a struggle to the death. No wreaths of smoke obscured the prospect: the fight with all its pitiless carnage was open to view, and far, we may believe it, over that quiet summer-sea

re-echoed the thundering crash of the ram, the heavy rattling fall of the corvus, the shouts of fury, and the shrieks of pain.

Come with me now, in thought, for a few minutes more. Let us stand, in spirit, upon the beach of the great harbour of Syracuse, and see the fate of that great fleet, the departure of which, amidst all the enthusiasm of popular exultation, we witnessed but a short time ago. The scene is now far different. There is no gladness, but sadness everywhere. The reinforcements have come, but the fleet reinforced has been beaten. Athens no longer can claim supremacy on the sea. Her tactics are useless in this close land-locked bay. Worse still, the very mouth of the bay is closed by the enemy; there is no escape. Only a narrow strip of shore, where the naval camp is standing, can be called our own; the rest is in the hands of the enemy.

"Truly we came to beleaguer yon city, whose circle of walls is still unbroken, but are now ourselves beleagured—besieged rather than besiegers. The months have been months of misadventure and mistake, and of labour in vain. All has deteriorated, men and material alike—our ships are heavy, their timbers are sodden—our hearts are heavy, and our strength is failing. One more desperate attempt must be made. We must change our tactics. Grappling-irons must be used, archers and slingers must crowd our decks. Our old seamanship is gone; our pride, it is now of no avail. Here come the chiefs—not Lamachus. No; he is at rest up yonder, on the hill. He sleeps in a soldier's, not a sailor's grave. No! nor Alcibiades. Where is he? Who knows? Perhaps at Sparta, plotting against his country; perhaps in Asia, intriguing with the Persian. Why did they not try him before we started? His youth and cleverness might have been of good service ere now to us. But he is gone; he is a traitor; why talk more about him? Nicias is here, the only one of the original three, and the good omen clean taken out of his name. How pale and wasted he looks, scarce dragging his limbs along for pain. Verily, if the Athenians had taken his advice, and recalled him, they would have done well. And with him is Demosthenes, a famous captain, the best of our time. Why send him out too late? Why send him out at all, unless with full powers to do what his experience dictates? As it is, he is crippled by Nicias, well meaning man, with his superstitions, and false hopes, and dangerous intercourse with Syracusan traitors, who make him their dupe." Such are the murmurings that we overhear, but now the necessity for action silences complaints. The ships are manned, the chiefs address their captains, the captains their crews. They speak with all encouragement; they tell them of home and country to be seen once more, if they win the day; they tell them of the honour of Athens to be maintained. Let us stand aside and see the battle. The fleets are nearing each other. Part of the Athenians are detached to break the barriers that close the harbour mouth. With that the action commences—a fight unparalleled, where, in a narrow space, less than a mile broad, 200 vessels are crowded together in mortal conflict. At first, the Athenians almost succeed in loosing the barrier, but the

Syracusan detachment there is reinforced, and the fight becomes general over the whole harbour. The struggle is long and intense, crews and helmsmen and troops alike vying with each other in doing their best. The land forces of either side, drawn up on the shore, are in agonies, at one time shouting for joy, at another time groaning with despair, as they witness the victory or defeat of their friends: swaying their bodies to and fro in frantic excitement, following, by gesticulations, the movements of the combatants. At last the fatal moment comes. The Athenians can hold out no longer; they turn and fly towards their camp, pursued brilliantly by the Syracusans, with shouts of triumph. The two great hulks, with the dolphins suspended over the entrance to their naval stockade, protect some of their ships—the rest are run on shore. All is now over. Demosthenes would fain, with picked crews, make one more attempt to break out, but the men are cowed, their spirit is broken, and they refuse to go on board. Nothing remains but a retreat by land, and so, on the third day, leaving the dead unburied and the wounded uncared for, burning some ships, and leaving the rest to fall into the enemy's hands, the remnants of the Athenian force, numbering still 40,000 men, start on their hopeless march, to end in death or slavery.

Sad is the story of broken pride and humbled ambition, but its lessons are wholesome and instructive, and the conduct of Athens, in her humiliation, still unyielding, still courageous, sheds a lustre on the dark days of her calamity. Truly, in virtue of this noble spirit, she had a brighter life in store for her in after time, brighter than that which the selfishness of commercial Carthage either deserved or obtained.

LECTURE.

Friday, May 19, 1876.

GENERAL SIR WILLIAM CODRINGTON, G.C.B., Vice-President,
in the Chair.

THE CONVENTION OF GENEVA, AND NATIONAL SOCIETIES FOR AID TO SICK AND WOUNDED SOLDIERS IN WAR.

By JOHN FURLEY, Esq.

MORE than once I have been requested to address a public audience on the subject chosen for to-day; but I have hitherto declined to do so, feeling that it might be considered presumptuous in me to offer suggestions on a matter which is more particularly within the province of members of the military and medical professions, or more properly still, perhaps, of persons possessing a combination of qualities which belong to both. But I have waited in vain for somebody more fitted than myself to undertake this duty, and I now ask for every indulgence, whilst I endeavour in the brief time allowed me to draw attention to the Convention of Geneva, as well as to what the National Societies for Aid to Sick and Wounded Soldiers in War have already accomplished, and what will be expected of them in the event of another war.

Although anxious to avoid obtruding my own individuality as little as possible, I shall not be misunderstood when I say, that nothing but my own personal experience on the subject I am about to discuss, gives me any right to appear here to day. This experience dates from the Schleswig-Holstein war in 1864, when I first learnt to appreciate the value of volunteer assistance in military hospitals; and it was greatly extended during the Franco-German war. Subsequently, I was attached to the Army of Marshal MacMahon during the war of the Commune; and more recently I have served with Spanish ambulances both in the Army of the Government of Madrid, and in that of Don Carlos.

And here let me anticipate any expression of opinion that Red Cross Societies ought to hold aloof from civil war and rebellion. It is undoubtedly right that the national societies of countries not immediately affected by a civil war should abstain from any active in-

terference in it: but it is quite otherwise with those principally concerned, as the French Société de Secours aux blessés militaires during the Commune, and the Spanish Society in the Carlist war; especially when, as in the former, the insurgents were practically acknowledged as belligerents by M. Thiers, and in the latter when the Alphonsists and Carlists mutually treated each other as on an equal footing. No person who was a daily witness of the awful horrors of the Paris Commune, or who has served as an ambulance volunteer on battle-fields in the north of Spain will be inclined to assert that wounded Communists and Carlists had no right to any sympathy. Humanity protests against such a conclusion. To their honour be it recorded that some of the most prominent members of the French Société de Secours remained at their posts in Paris throughout the whole period of the Commune, and relieved the sufferings of hundreds of Communists, whilst their colleagues were at Versailles, engaged in the same manner amongst the soldiers of the Government and the wounded prisoners who fell into their hands. And so with regard to Spain, the Red Cross Society of Madrid and the members of the *Caridad* (a Carlist society, of which the Doña Margarita was the President) made no difference between friends and foes.

It is quite unnecessary to recapitulate the history of the Convention of Geneva. An attempt to do so would almost involve a history of war itself. It had long been acknowledged that no Army ever possessed medical and sanitary means equal to the exigencies of a great campaign; and this feeling culminated in the splendid voluntary efforts which were made to relieve the sick and wounded soldiers during the Crimean war, and in the war between the Northern and Southern States of America. Notwithstanding the universal conviction as to the insufficiency of all official means for carrying off wounded men from the field, applying temporary relief and subsequent attendance in the hospitals, no attempt was made to obtain the opinion of the civilised nations of the world as to the best manner in which to meet this great want, until the year 1863, when the first Conference was held at Geneva. From this meeting emanated the Convention which was adopted on the 22nd August in the following year.

But even were it necessary to remind my audience of the various circumstances which gradually led to the Congress at Geneva, when that Convention was framed which less than a year afterwards was accepted by nearly all the States of Europe, I should have good reason for hesitating to do so.

In 1866, from the place I have now the honour to occupy, Deputy Inspector-General Longmore, C.B., Professor of Military Surgery at the Army Medical School, at Netley, described, in language and with an authority to which I cannot pretend, the development of that idea which found expression at the International Conferences held at Geneva in 1863 and 1864.¹ At Berlin, Paris, Vienna, and elsewhere, during the last ten years, I have assisted at the official meetings at which the Convention has been discussed, modified, and extended; and I am glad to have this occasion to bear testimony in presence of my

¹ See Journal of the Institution, vol. x, p. 162, *et seq.*

own countrymen to the important influence which Mr. Longmore has exercised upon the deliberations of those who have borne forward and marched under the Red Cross Flag. I can personally testify to the fact that there is not in Europe an army hospital establishment, or a society for the relief of sick and wounded soldiers in which the valuable assistance rendered by Professor Longmore is not acknowledged; and there is not one in which his professional brethren and all those who, like myself, have had the honour to be associated with him, do not admit he is one of the very few representatives of different nationalities who thoroughly understand the Convention of Geneva in all its bearings, both civil and military, and under whose cautious guidance the humanitarian theories which were advocated at Geneva, have become accomplished facts. I am quite aware that this mention of his name would not be in harmony with the characteristic modesty which so distinguishes the gentleman of whom I am speaking; but as one of the rank and file of the Red Cross army, I could not forego this opportunity of paying a humble tribute to one of the worthiest, most conscientious, and most honourable of our chiefs.

Has the Convention of Geneva succeeded in accomplishing that which its promoters expected of it? It may be unhesitatingly affirmed that it has done so. In some respects, perhaps, it has partially failed in its objects, whilst in others, those who without authority, have adopted it, have gone far beyond the limits which this international agreement was intended to define: but on the whole the opinion of the civilized world has prevailed, hundreds of lives have been saved, and comfort and consolation have been brought to wounded and dying men by the intervention, not only of accredited volunteers, but of irregular helpers, who have boldly taken possession of an agreement that was never designed to give them the benefits of neutrality in war, however benevolent their intentions might be.

The good effects of the first Conference held at Geneva were immediately made evident in the Schleswig-Holstein campaign. In February, 1864, nearly six months before the King of Prussia signed the Convention, a society was formed at Berlin, and an appeal was made to the nation on behalf of the sick and wounded soldiers. This undoubtedly contributed to the success of the second Congress held in the same year.

The Convention was tried cautiously, and on a comparatively small scale during the short campaign in Bohemia in 1866, but this could not be considered a decisive trial, as Austria had not then signed the Treaty. The Prussian Red Cross Society, however, gave good proof of its labours during the two years that had elapsed since its formation. On the day the battle of Langensalza was fought, in response to a telegram stating that there were 1,500 wounded men lying on the field in want of the simplest necessities, three special trains laden with surgical aid and hospital material, left Berlin at midnight. The work then performed by the Prussian Society was sanctioned by the Government, and its agents in the field were under military control.

But although such societies had been established in several countries,

with the approval of their respective Governments, it was not until the year 1870 that the Red Cross assumed a position that had never been contemplated even by its most sanguine adherents.

At the very commencement of the war, France and Germany were covered with a network of aid committees. This contagious benevolence spread to other countries, which, though remaining at peace, determined to do their share towards the relief of the sufferers in a war that was evident would soon count its victims by thousands. Everybody talked of and worked for the Red Cross. Funds were liberally subscribed; immense dépôts of gifts in kind were formed, and rich and poor contributed their pence, their pounds, and the work of their own hands to this novel undertaking, which appealed so irresistibly to the genuine sympathies of all. In a word, one great international impulse seized upon the Convention of Geneva, and gave to its articles the meaning which best satisfied humanity.

It was not only in France and Germany that volunteer societies, for the relief of the victims of the war, entered on the campaign simultaneously with the combatant troops which were marching towards the Rhine. Volunteers from almost every State in Europe which possessed a Red Cross Society, at once enrolled themselves under the new flag, and appealed to their compatriots for material assistance. Belgian, Dutch, and Swiss doctors, nurses, and ambulance helpers immediately appeared on the field, and others soon followed.

When the rival Armies of France and Germany first came into collision, in the month of July, 1870, England had no such Society; but in the first week of August we had one, with a fund which was rapidly assuming large proportions, and a numerous band of volunteers, in presence of whom the only difficulty was one of selection.

The circumstances connected with the establishment of the British National Society for Aid to Sick and Wounded in War, are so well known that it is unnecessary I should trace its origin or describe all that it accomplished in 1870-1. But I may be allowed to recall certain facts, a forgetfulness of which has encouraged the belief that the British Society was formed only for the Franco-German war, and that it will remain in abeyance until another international war shall again call it into a state of activity.

At the first public meeting of the Society, held at Willis's Rooms, on the 4th of August, 1870, it was resolved, "That persons be admitted as Members of the Society on payment of £5 donation, or 5s. annual subscription." At the same meeting the two following resolutions were also adopted:—"That a Central Committee of 21 Members be appointed to assist in carrying out the objects of the Society. That the said Committee be annually elected, by rules similar to those of the National Rifle Association. That Sub-Committees of the Society be established in various parts of the country, and that these Sub-Committees regulate their own subscriptions, manage their own affairs, defray their own expenses, and transmit to the Central Committee such contributions as they are able to collect, and such material as may be suggested from time to time by the Central Committee."

Now, these resolutions were framed with the intention of making

the Society a permanent institution in this country, on the broadest possible basis.

It is not perhaps surprising that, when the war was concluded which had brought the Society into existence, and which had taxed to the utmost the strength and energy of the London Committee and all who had been actively employed as its agents, these resolutions were forgotten, and those who had laboured under the able direction of Lieutenant-Colonel Loyd-Lindsay, *U.C.*, *M.P.*—whose name will ever be honourably associated with the grand effort which England then made in the cause of humanity—were only too glad to furl their banner and return to those avocations from which they had been drawn.

No one will, I think, venture to predict that wars have for ever ceased, or even, looking towards the eastern horizon, that we have entered upon a long period of peace. Whether in any future war we may be engaged as principals or spectators, the moment it breaks out, attention will naturally turn towards the British National Aid Society, and much will be expected of it. Undoubtedly the call will meet with a generous response; but the same lenient criticism that was accorded to the work in 1870 must not be expected. At the outbreak of the Franco-German war, as I have already remarked, there was no British National Aid Society, but the sympathy of the nation made the formation of one a comparatively easy task. Volunteers, money, and gifts in kind were speedily dispatched to the seat of war. The result was grand, but such an experiment can never be repeated.

I make this assertion advisedly, and after the most careful consideration. What an English society might do in supplementing the work of our military medical establishment, in time of war, and what it will be allowed to do, in the same capacity, for foreign Armies, are two different matters. But they are questions that must be settled, if the Society is to be a permanent and an useful institution.

The Crimean war afforded an example of what English men and women will do for their own soldiers; and British energy and philanthropy will, I trust, always be equal to even greater trials than that was. But the Crimean war brought home to us all two facts of which the promoters of the Convention of Geneva did not fail to make use: namely, that no Army can possess in itself a hospital establishment and sanitary means equal to the emergencies of a sanguinary campaign, and that no satisfactory supplement to it can be extemporized at a moment's notice. All that individual devotion and public generosity could accomplish for our sick and wounded soldiers was witnessed in 1855-6. And if the necessity should unfortunately again arise, this would be repeated. But "*para bellum*" is a good motto, even when applied to military hospitals and Red Cross societies.

What I have just said refers more especially to the relations which have existed, and which may again be created, between volunteer hospital helpers and our own Army. This is the easiest part of the question to which a solution is required. But the Convention of Geneva affords the benefit of reciprocal neutrality to all non-combatants who may be serving in the hospitals of belligerent Armies. Such persons are now distinguished by an armlet, with a red cross on

a white ground, which is generally believed to be given to them under the authority of the Commander-in-Chief of the Army to which they are officially attached, but which, in 1870, were manufactured and distributed in the most indiscriminate manner. I need say no more as to the way in which this Article of the Convention was treated in 1870, only now remarking that, whether it be for our own Army or for that of a foreign State, it is quite impossible properly to comply with this or any other of the provisions of the Convention of Geneva at the outbreak of wars carried on as rapidly as they now are, unless all the preliminary arrangements have been settled in time of peace.

I have already spoken of the general ignorance that prevails as to the Articles of the Geneva Treaty. Fortunately, this was of little consequence during the Franco-German war, and the fullest latitude was allowed to those who were attending to the sick and wounded on the field, and in the numerous hospitals which were scattered over France. An agent of the British Society determined to accomplish his mission could go almost where he pleased, without meeting with any obstacle sufficiently serious to stop him. German sentries or French *franc-tireurs* might cause delays, or a siege might compel him to alter his course; but in other respects his liberty of action was almost complete.

But this freedom must not be entirely attributed to the benevolent consideration which Generals and Commanding Officers are willing to bestow on all persons engaged in hospital work. As was said by the late Dr. Loeffler, Surgeon-General in the Prussian Army, "*la tactique prime la philanthropie*;" and as long as there are wars, so long will humanity suffer from countless concomitant evils. Unless Generals are in a position which permits them to be generous, they must not be expected to bestow much thought on any but combatant followers. Hence it is necessary that every branch of an Army should be an integral part of the whole; and even a volunteer ambulance should be under strictly military discipline, and attached to a division or brigade.

But the Franco-German war, from which the best experience of the working of the Convention of Geneva and the Red Cross Societies can be drawn, was altogether an exceptional campaign, and this not so much on account of its magnitude as by reason of the one-sided character of its principal results. Even the most sanguine anticipations of the conquerors were surpassed by the first engagements, and situations were created which had never been foreseen by the advocates of the Geneva Treaty. The framers of this international agreement had not imagined, that in the event of a war almost all the States of Europe would send delegates to the relief of the victims. There is not a single paragraph in the Convention, or in the Articles which were subsequently added to it, which refers in any way to the presence with belligerent armies of a body of volunteer helpers from neutral States with stores intended for use in field-ambulances and stationary hospitals. The peculiar character of the Franco-German war made the introduction of this novel element comparatively easy; and, looking at the results, it would be hypocritical now to examine too severely

the free and easy manner in which the objects of the subscribers to the various Red Cross Societies were accomplished. One of the belligerents was so completely overmatched by the other, that the latter could afford to allow considerable liberty of action to those who had come with vast stores to aid in relieving the thousands of victims who were scattered over the country from the Rhine to the Loire and the Seine. No doubt the German head-quarter staff would have preferred the *matériel* without the *personnel*; but as these could not be separated, they accepted the arrangement which was imposed upon them, and regarded with considerable indulgence the "eccentricities" of this new feature of modern warfare."

As far as possible complete impartiality was observed by the conquerors in the treatment of the sick and wounded of both armies; but it must be borne in mind that, owing to the course of the war, almost the whole of the neutral assistance was absorbed by the Germans. A separate and exact partition between the belligerents was impracticable after the first few weeks of the campaign, and no share intended exclusively for the French hospitals, with the remarkable exception of the 20,000*l.* carried into Paris by Lieutenant-Colonel Loyd-Lindsay, could reach them, as they were completely blockaded on all sides except towards the south.

The greater part of the share of assistance intended by volunteer societies for France found its objects in the hundreds of wounded prisoners who were left amongst the Germans. Both sides enjoyed the benefit of extraneous aid, and it is impossible to calculate the number of lives saved by this means. But those who were shut up in towns which were besieged could not derive any of the assistance from without. This isolation in some places was of short duration; in Belfort and Strasbourg it was for a longer period, whilst in Metz it lasted rather more than two months, and in Paris for five months.

Nothing better exemplifies the status of volunteer ambulances from neutral States during the Franco-German war than that of the Dutch Society, which was under the direction of M. Van de Velde.

This gentleman, accompanied by four or five surgeons, a secretary, and one or two other persons, arrived at Versailles about the 12th September, 1870. At this time the Red Cross Committee of that town, of which M. Horace Delaroche was president, had established a hospital of 105 beds in one of the numerous wings of the palace. The whole establishment was immediately offered to M. Van de Velde, as it was evident that Versailles was about to become the head-quarters of a German army-corps, and it would be useful to have a hospital there under the protection of citizens of a neutral State. There were then six wounded men and nineteen cases of typhus, all Frenchmen, in the hospital. A few hours later there was fighting in the neighbourhood of Versailles, and M. Van de Velde and some of his staff went out in the direction of the firing. On their return in the afternoon they

¹ Inspecteur-Général Dr. Chenu, at the Conference held at Geneva in 1863, said, in reference to the employment of volunteer hospital assistants, "L'Amérique seule 'peut se permettre de telles excentricités.'" Since that time no person has worked more zealously than he has done with volunteers under the Red Cross flag.

found that Versailles had capitulated, and the chief of the Prussian medical staff of the 3rd Army Corps, Dr. Kirchner, had taken possession of the chateau, including the Dutch ambulance, and was then establishing a large German hospital. The twenty-five sick and wounded Frenchmen actually in the chateau were removed to other houses in the town, and the acting *personnel* were requested to obey the new chief. M. Van de Velde contended that this was a violation of the Convention of Geneva; but he was answered by a reference to the explicit instructions laid down for the sanitary service of the Prussian Army; according to which, voluntary aid to the sick and wounded cannot be independent of the Army, but it must be incorporated with the organisation established by the Government, and directed by its Officers in order to avoid any interference with official action.

I repeat that no Article in the Convention of Geneva refers even remotely to the supplies of neutral volunteer societies. However, this was not the belief in 1870, and I can best illustrate some of the difficulties which arose by the following example which occurs to me.

Paris was closely invested. Nothing was allowed to be sent in for the use of the hospitals, and it may be said that nothing was absolutely wanting in them. A convoy of goods intended for the *dépôt* of the English Society at Versailles, and under the command of Mr. Thomas was stopped at Vernon, and only such articles as were evidently for hospital use were allowed to be taken on. Food, and there were many cases of biscuits, was absolutely prohibited. This was indignantly pronounced to be a contravention of the Convention of Geneva. But even supposing it had been so, I think it would not have been surprising if persons who, perhaps, had never even read that document, had regarded such a cargo with suspicion, and had argued that if their enemy prevented anything from entering Paris, they had a perfect right to do their best to blockade the head-quarters of that enemy.

Let me offer another illustration which will still further exemplify my meaning. We all remember what heroic efforts were made, especially by the women of England, for the relief of the sick and wounded soldiers in the Crimea. Red Cross Societies had not then been established; but supposing they had been in existence, is it likely that the English and French besiegers would have allowed hospital supplies to have passed through their lines into Sebastopol, or would their enemy have permitted similar stores to have been sent over Russian territory to the hospitals of the allied armies? I think not, and yet this was the sort of benevolence which in 1870 it was imagined would be tolerated under the Red Cross Flag.

Notice of bombardment is, or should be, always given to the inhabitants of a town before any shots are fired into it, in order to allow time for the departure of non-combatants, and aged and sick persons. But when once a siege has been commenced, in the interests of humanity it is not desirable that this should be prolonged by any sentimental considerations.

Thus far I have endeavoured briefly to call to mind the origin of the Convention of Geneva, and the manner in which the Red Cross

Flag first gained a position on the battle-field. I have also described how this treaty, which was only intended to cover sick and wounded soldiers and the *personnel* and *matériel* of military ambulances and hospitals in time of war, was invoked in 1870 for the protection of independent volunteer helpers and stores from neutral States.

I propose now to devote a short time to these two important questions.

1stly. Can the Convention of Geneva be maintained in its present form, or is it desirable that it should be modified or extended?

2ndly. How can the British National Aid Society be so employed in time of peace as to be in a fit state to supplement the hospital service of the British Army if called upon to do so in time of war?

Now, however much this celebrated Treaty of Geneva may be open to criticism, I do not think that any assembly in the civilized world would vote for its abrogation. The treaty itself is clear and distinct; and almost all the mistakes which have been committed under its *assumed* sanction have arisen from ignorance of its Articles, and the pardonable zeal of persons who have adopted the spirit of that international agreement rather than the letter.

Few persons have read this document; and the vague notions which exist as to the general meaning of the treaty were still further confused by the irregularities which were permitted to "benevolent neutrals" during the Franco-German war.

Whatever may have been suggested before or since the adoption of the Convention of Geneva, the first words of the first Article in it expressly define the limits to which this agreement was intended to be confined. They are as follows:—"Military ambulances and hospitals shall be acknowledged to be neutral, and, as such, shall be protected and respected by belligerents, &c." As was said by Professor Longmore in 1867, and repeated by him in this theatre in 1872,¹ "The treaty only comprehended the military ambulances and hospitals of the belligerents, the staff employed in attending the sick and wounded contained in them, and the materials necessary for their proper treatment. Its articles did not provide for any volunteer or independent staff of hospital assistants; and such persons could only participate in the provisions of the Treaty by being regularly admitted into the hospital service, and forming for the time being part of the military establishments of the armies engaged, and thus becoming subject to the ordinary rules and articles of war. These latter would then come within the provisions of the treaty, because then they would be comprised in the *personnel* of the military hospitals, as laid down in the second article of the treaty." At the Congress of 1864, it was unanimously determined by the official delegates then present, to exclude from the text of the convention that part of the circular note which had been sent by Switzerland to the Governments of all civilized countries, which suggested the neutralization of voluntary hospital assistants recruited by aid committees, and to confine the neutralization to the official sanitary *personnel* of the hospitals of the belligerents.

¹ See Journal, vol. xvi, p. 206, *et seq.*

Enough has been said to prove the manner in which the agreement was infringed during the Franco-German war. If no personal assistance had been given to the hospitals of the belligerents by the societies of neutral States, there would have been little necessity for any reconsideration of the Treaty of Geneva. This document is sufficiently explicit for all the purposes for which it was intended, namely, the neutralization of military hospitals and ambulances in time of war. But a precedent was set, which, though attended with excellent results from a humanitarian point of view, only escaped introducing a most serious international complication by the force of circumstances, which were exceptionally favourable to the philanthropic experiment which was then made. Such an occasion might be repeated; but I, for one, cannot believe it will arise.

A flood-gate has been opened which can never again be closed; and I feel no hesitation in asserting, that the Convention of Geneva cannot be maintained in its present form, unless the position, in time of war, of the volunteer *personnel* of national societies—other than those of the contending nations—with regard to the hospitals and ambulances of the belligerents be clearly and unequivocally defined.

The second question is: How can the British National Aid Society be so employed in time of peace as to be prepared to supplement the hospital service of the British Army if called upon to do so in time of war?

This proposition is purposely limited to the connection which ought to exist between the Society and the Army, because this should be the paramount object.

I will briefly describe what the Continental Societies have done, and are doing. Their work includes much that does not strictly belong to the province of Red Cross Societies; but a general description of their labours will perhaps lead by inference to a more useful and practical solution for ourselves, than any dogmatic expression of my own could possibly do.

The International Exhibition, held in Paris in 1867, gave an opportunity to France to exhibit the practical side of the humanitarian ideas developed by the Convention of Geneva. On the initiative of Count Sérurier, who was one of the earliest promoters of that Treaty, and who is still one of the most zealous and indefatigable representatives of the Red Cross, a large exhibition of hospital and sanitary material was organized; and, in connection with this, a Conference was held, which was virtually the starting point of the activity which has been displayed by the National Aid Societies of Europe.

The Société de Secours aux Blessés des Armées de Terre et de Mer has made remarkable progress since the war of 1870-1.

Notwithstanding the enormous amount of work which devolved on the members of the Paris Central Committee in that terrible year, they have not once discontinued their labours. What was done by the Society during the Franco-German war can be gathered from the voluminous statistical report of Dr. Chenu, Inspector-General of Ambulances. Immediately after the war, there was the repatriation

of the French wounded, who had been prisoners in Germany; and this was accomplished under the personal direction of Baron Mundy and M. Albert Ellissen. Nor even then did the Central Committee consider that its duties towards the victims of the war were at an end.

Artificial limbs and costly surgical appliances were provided for those who had been mutilated, and pensions were granted to invalids, as well as to widows, orphans, and the aged parents of those who had died in the service of their country. The graves of the dead were also carefully marked, and in some places monuments were erected.

In 1873, an exhibition of hospital and sanitary material was held in Paris, and six diplômes d'honneur, eleven gold, thirty-one silver, and sixty bronze medals were awarded by the Society for the best inventions which could be utilized in hospital work. It was then that the kitchen-waggon was first introduced; and the time will assuredly come when no ambulance column will be considered complete without such a carriage. I may add, that this model, constructed by M. Kellner, of Paris, is one of the admirable inventions chiefly due to the ingenuity and indomitable energy of Baron Mundy.

But certainly one of the most important steps of the French Society was taken in April, 1874, when a conference of delegates from all the departments in France was held in Paris. Resolutions were then adopted which, whilst recognising the superior control of the Paris Central Committee, allowed each of the Provincial Committees certain freedom of action, and the disposal of its local funds, with the exception of a fixed proportion which is to be sent annually to the Treasurer of the Central Fund.

At this meeting it was also suggested by M. Albert Ellissen that eighteen centres of action should be established corresponding to the head-quarters of each of the Army-Corps, and that eighteen dépôts of hospital material should be formed.

The material of a divisional ambulance is to be composed as follows:—

- One omnibus.
- One large fourgon.
- One small fourgon.
- One kitchen-waggon.
- Five ambulance carriages.
- One carriage for medical and surgical stores.
- One box of surgical instruments.
- Fittings, &c., for the large fourgon.
- Fittings, &c., for the small fourgon.
- 19 furnished hampers for the fourgons.
- 50 stretchers.

The total cost of each divisional ambulance to be 30,000 francs (£1,200).

It was also proposed that a delegate of the Society should be attached to the General commanding each military territorial division.

Many other propositions were made, including one for the formation of a special institution where medical students and nurses should

receive practical instruction on all subjects connected with field-hospital work.

I have thus briefly indicated some of the principal points to which the French Society has devoted its attention since 1871.

I have already alluded to what Germany in general, and Prussia in particular, have done towards the development of volunteer hospital relief in time of war. The interval which elapsed between the Danish war in 1864 and the outbreak of the war in 1870 had been well employed by the Berlin and other German committees; and the experience gained in the seven weeks' war of 1866 was not without value. The Franco-German war was declared on the 17th of July; on the 19th the Central Committee of Berlin made an appeal to the nation; on the 20th it announced that gifts to the Society, whether sent direct to the principal depôts or addressed to the different army corps, would be conveyed free on all the State railroads. At the same time the King of Prussia appointed Prince Pless as Royal Commissioner and Military Inspector of Volunteer Assistance. He was to be the medium between the Aid Societies and the Army in the field; and it is well to call attention to the fact that he alone had the right to distribute the Red Cross brassards, and to give authority to wear them. Under Prince Pless a delegate was attached to the head-quarters of each Army operating in an independent manner; and one was also appointed to every corps of such Army. Besides these were sub-delegates at the different Etapes, and others whom it is unnecessary to specify.

All the principal offices in this volunteer department were held by men of position, who, like Prince Pless, were members of the Order of St. John, or of that of Malta, the former (Johanniter Ritter) being Protestant, and the latter (Malteser Ritter) Roman Catholic.

During the war of 1870-1 there were in Germany 25 principal, 1,956 sectional committees, with more than 250,000 members, all working more or less under the direction of the Berlin Central Committee.

The Central Comité der Deutschen Vereine zur Pflege im Felde verwundeter und erkrankter Krieger differs from the French Central Committee in many respects; but there is one very important point of dissimilarity. The French Society not only devotes itself to sick and wounded soldiers and sailors in war, but, as I have already said, it grants pensions to invalids, and to the widows and children of those who have died in war or from its effects. The German Red Cross Societies do not directly undertake this branch of relief, but they leave it to sister societies, which work in connection with them. Of these the principal is the Kaiser Wilhelm Stiftung, an institution which supplements the pensions given by the State to disabled Officers and soldiers, and their widows and children.

However, it seems that the German Societies now intend to admit within the sphere of their labours in time of peace, such calamities as may be caused by fire, inundation, or epidemics.

Amongst the German Societies auxiliary to that of the Red Cross may be mentioned the Ladies' Societies (Deutscher Frauen Hilfs und Pflege Vereine) of Berlin, Munich, Dresden, Stuttgart, Darmstadt, and Carlsruhe. In consideration of the services rendered by these, in

the training of nurses and hospital assistants, who may be employed in time of war, subventions are granted by the Central Committee. It would be difficult, even if it were necessary, to enumerate all the different institutions which are thus working, directly or indirectly, for the objects of the Red Cross. Incidentally I may name the Deaconesses' Institution at Bielefeld, the Friedrich-Wilhelm-Victoria-Stiftung at Insterburg, the Mutterhaus at Kiel, the Sanitary Institution at Loschwitz, near Dresden, of which Madame Simon is the directress, the asylum for female nurses at Frankfort-on-the-Main, and the Augusta Hospital at Berlin.

The title of this last most excellent institution reminds me that no account, however incomplete, of what the Germans are doing to alleviate the sufferings caused by war would be just, did it omit to acknowledge that the Empress Augusta is not only the President of the German Central Society *de jure*, but also *de facto*. In every way, by word and example, she has encouraged and urged forward the work both in peace and in war; and whether at Berlin or in the provinces, she seems to regard any fatigue as light which enables her to assist it by a gracious act. Nor is Her Majesty less generous with her purse. During the Conference held in the Red Cross Pavilion at the Universal Exhibition of Vienna, in 1873, she awarded twenty gold medals for the best models of hospitals and surgical appliances for the relief of wounded soldiers, a prize of £300 for the best essay on the Convention of Geneva, and a prize of similar value, and two prizes of £75 for the best manuals of military surgery. Of the medals not one came to England, which was scarcely represented in this department of the Exhibition: but it is satisfactory to know that Surgeon-Major Porter, Assistant Professor of Military Surgery at the Royal Victoria Hospital at Netley, gained one of the prizes for his treatise on military surgery.

The work of the German Red Cross and kindred societies is far too extensive to allow of its being described in detail in one short paper; but I may mention one important fact that deserves to be noticed. Quite recently in every province of Germany a corps of *kranken träger* (bearers) has been enrolled and attached to the army-corps of that province. Each man is furnished with a uniform, and he is paid a small annual sum, in consideration of which he must undergo the necessary training, and he must hold himself ready to march with his division in the event of war. It may be briefly summarised as follows: Germany possesses six Central Committees at Berlin, Munich, Dresden, Stuttgardt, Darmstëdt, and Carlsruhe, with a superior Committee at Berlin. Under these are some hundreds of less important Committees. In peace, hospitals for invalid soldiers are maintained, nurses and ambulance-helpers are trained, exhibitions of hospital and sanitary material are held, and, as I have shown, prizes are bestowed for the best models, and also for the best essays on given subjects connected with hospital work. A military inspector and commissioner for the volunteer societies assists at Conferences held at the Ministry of War; and in fact the most complete solidarity is maintained between the various Societies, the Committees, and the War Department. On the outbreak of war, as was witnessed in 1870, a message flashed along the telegraph-

wires from Berlin is sufficient to militarize the whole system in the course of a few hours, and the German Red Cross army is found to be almost as completely organized as the combatant portion of the Army of the Fatherland.

As has been already stated, it was not until after the campaign in Bohemia in 1866, that Austria signed the Convention of Geneva. A Red Cross, or Patriotic Society, was then formed, which, as far as I can gather, has since been chiefly employed in supporting invalids, the victims of that war. The annual Reports of the society indicate that all its stores have reference to treatment in fixed hospitals; they are in fact hospital equipment stores, with the exception of three carriages, each for one wounded man, which are probably intended for bringing patients to fixed hospitals, and not for use in the field.

During the Franco-German war, Austria was officially represented on the German side by Professor Billroth, and on that of France by Professor Mundy. Each was accompanied by one or two surgeons and hospital assistants. This is an interesting fact, because it was the first time that the government of a neutral state sent surgeons to aid the medical establishments of the belligerent armies, in accordance with the desire expressed at the Berlin Conference in 1868.

But the Austrian Red Cross Society had no organisation for war, and was only able to contribute a few stores.

It must not be thought because the Austrian Patriotic Society is less actively employed than those which have just been mentioned, that the relief of sick and wounded soldiers in war receives less consideration in Austria than in France or Germany. This is by no means the case. The Teutonic order of which the Archduke William is Grand Master, has, with the sanction and approval of the Minister of War, now taken the lead in this direction in the most liberal and intelligent manner.

This order already possesses forty sanitary columns ready to supplement the forty infantry divisions of the regular army. The material which comprises ambulance carriages and fourgons with their contents, is distributed over seventeen garrison towns, in several of which the order has constructed special waggon-sheds at its own expense. It has spent £30,000 in forming sanitary trains for the first line, and a reserve fund of £15,000 will be required to place them on a war footing. By request of the Ministry of War, the baggage-waggons have been arranged, in case of need, to carry severely wounded men. In this and in many other ways it is needless to particularise, the expenses incurred by the order have been increased and have far exceeded the original estimates. The possibility of mountain warfare has not been forgotten, and experiments are still going on with the object of arriving at the best forms for bearer-chairs and bearer-baskets.

Regulations for the guidance of the order in its relations with the army are now in course of arrangement at the Ministry of War.

It is the intention of the order to establish a divisible fixed hospital for 600 wounded men; but the number is to be limited to 200 until the funds are sufficient to allow the plan to be fully carried out.

I may also add that this distinguished order, on the roll of which are most of the noblest names in Austria, maintains three hospitals for the civil population. At the beginning of last year, there were in these 36 patients; during the ensuing twelve months, 332 were admitted, of whom 303 went out cured, 24 died, and 41 remained at the end of the year.

Another noble order, that of the Austrian Knights of Malta, has also entered the same field of benevolent activity; and it has undertaken to provide twelve sanitary trains for use on railroads. The value of such trains can scarcely be appreciated in this country; but it is otherwise on the continent, where in all recent wars, railroads have played a very important part, both in military operations and for hospital purposes. The best model that has yet been used was that employed by the Germans during the Franco-German war; but this has been surpassed by the train which was built in Paris from the designs and under the superintendence of Baron Mundy for the French Société de Secours. This was first exhibited in the *Sanitäts Pavillon* of the Vienna Exhibition in 1873. It contains wards for the patients, separate rooms for the medical officers and nurses, a kitchen, store rooms and everything necessary for the purpose for which it is intended. In a word, it is best described as *un hôpital roulant*. It is on this plan I believe that the sanitary trains are being constructed for the Malteser Ritter, who will bear the expense and responsibility of this important supplement to the hospital establishment of the Austrian army in the field.

I have more than once casually mentioned the name of Mundy, but I must be allowed to say something more of this well-known and eminent Professor. In 1859, he was acting as Aide-de-camp to General Giulai at the head-quarters of the Austrian Army in Italy. He then left the combatant ranks in order to devote himself entirely to that profession of which he is now so distinguished a member; and in the war of 1866, we find the gallant cavalry officer transformed into Surgeon-Major of the Army in Bohemia. At the Conferences held at Geneva, Paris, Berlin, and Vienna, he appeared as the enthusiastic advocate of reforms in the treatment of the wounded. During the siege of Paris, he identified himself with the French Société de Secours aux Blessés, and he established and personally directed a large hospital at the Palace of the Corps Législatif, where he was ably assisted by Dr. Von Mosetig. During the Commune, he designed and constructed a Pavilion hospital, of novel form, for use in summer. This is still standing in the park of St. Cloud, it having been accepted by Marshal MacMahon on behalf of the Army. In 1870-1, ambulance carriages of the Mundy pattern were to be seen wherever there was a column of the Société de Secours; and, more recently, I have met in Navarre with some of these carriages and mountain stretchers, also the invention of Professor Mundy.

All that the two knightly orders I have mentioned are doing in Austria for the sake of the soldier may be traced to the inspiration of the same gentleman; but, as I have shown, in this respect he knows no nationality. Were I asked to name one man who, more than

any other, is the incarnation of the Red Cross idea, I should unhesitatingly say Professor Baron Mundy. In forwarding the cause he has at heart, he has spared neither his purse nor his person: and to his courageous perseverance, disinterested advocacy, practical ability, and restless energy must be attributed a very large share of the success that has attended all recent efforts for the alleviation of the sick and wounded in war.

Perhaps I ought to have abstained from any special allusion to the work performed by three or four of the National Aid Societies of Europe, unless it were possible to refer to others equally deserving of notice. But the reason for the selection I have made is obvious. It would take far too much time to describe in detail the system pursued by all similar societies, and I have therefore chosen those which have made themselves the most prominent, or which offer the best examples of the preparation that can be made in peace for time of war.

I might call attention to the activity of the Russian Society, and describe what it did in France and Germany in 1870-1; and later for its own troops in Khiva. More recently it has sent a well-equipped ambulance column to the Herzegovina. Like some other societies already mentioned, it has not limited its work to the alleviation of sufferings caused by war; it organized considerable relief for the victims of the famine in Samara, and also for the inhabitants of Mordhansk, which town was destroyed by fire in May, 1875.

When the war broke out in 1870, it is doubtful if any Society, except those of Germany, was so well prepared as the Dutch. This was, in a great measure, owing to the interest which had been excited by the admirable Exhibition of Hospital and Sanitary Material, and the Conference, held at the Hague in 1869.

The war in Atchin has offered other opportunities to extend the experience of this admirable Society, and to utilize some of the excellent *matériel* which it possesses.

Belgium, as in everything which exhibits civilization in its best and noblest form, also claims a high place for her Red Cross Society. And it will not be out of place, I think, if I call attention to the International Exhibition of all objects connected with the saving of life, and the Congress of Hygiène, which are shortly to be held at Brussels. The initiative in this case is entirely attributable to Lieutenant-General Renard, one of the first and most eloquent advocates of the Red Cross. He has travelled over Europe, endeavouring to obtain official recognition and the support of all the Governments in Europe for his useful and philanthropic scheme; and I earnestly trust that a great success may attend efforts which appeal so irresistibly to all members of Red Cross Societies, whatever may be their nationality.

Spain has been afflicted during the last few years by a miserable civil war, which fortunately has now ceased. The Red Cross Society, under the guidance of the Central Committee of Madrid, has performed good work; and La Caridad, a Carlist society with the same object, but under a different flag, has also laboured well in the same field. Whilst deprecating anything like jealous rivalry in such a cause, it is satisfactory to know that these two societies carried out

their one object, and acted with regard to each other in a manner worthy of the old chivalry of Spain.

It is a very common thing for the National Red Cross Societies to be included under one title—the International Society—and misconception on this point has led to many serious mistakes. Each Society is a national one, though the spirit which animates them all may be called international; and this reminds me that the solidarity which now exists amongst all the societies of Europe is chiefly due to two gentlemen, who were the most zealous pioneers of the Convention of Geneva. M. Gustave Moynier and Dr. Appia, during thirteen years, have laboured incessantly on behalf of that Treaty, which was first proposed in the *Société Genevoise d'Utilité Publique*. They assisted in framing it; and one or both of them has been present at every conference and exhibition of hospital material which has been held under the Red Cross. They have been the most active members of the International Committee which has its head-quarters at Geneva, and of which, since the death of General Dufour, M. Moynier has been the president. When the war broke out in 1870, they formed an agency at Bâle. This not only offered a means of communication between the societies of the belligerent states, but it also became a channel through which gifts from neutral States of a value of more than three millions of francs were distributed amongst the sick and wounded.

Whatever may be the fate of the original Agreement, the names of Moynier and Appia will always be associated with it; and we need be under no apprehension, but that the philanthropic work commenced at Geneva will continue to flourish under some name and flag so long as the world shall suffer from the curse of war.

I have thus described, in a general and by no means exhaustive manner, the work in which some of the Red Cross Societies of Europe are occupied in time of peace. Some portion of this work, excellent as it undoubtedly is, is of a nature which ought not to be comprised in the sphere of these institutions. For instance, it should be no part of their work to give pensions to invalid soldiers, or to the widows and orphans of men who have died in the service of their country. Such work is the legitimate province of the Government acting for the country at large. If done by a non-official establishment, such an establishment might be made collateral to that of a Red Cross Society; and I apprehend there is no reason why, in this country, a separate Society, like that which administers the Patriotic Fund, should not be formed to supplement pensions awarded by Government, and to watch over the interests of aged and crippled soldiers and sailors and their widows and children. I venture parenthetically to recommend an extension of this field of usefulness as one that would materially help to add to the popularity of military service in this country.

In time of peace, it is not only within the sphere, but it is the positive duty of a Red Cross Society, to use every opportunity to educate a staff for the work which it professes to be able to perform. This can be done through the instrumentality of institutions entirely supported by Red Cross Societies, or by means of independent establish-

ments partially subsidised by them. The best examples of this kind of instruction are to be found in Germany.

A few years ago we were told that the legitimate susceptibilities of the Army medical profession would be excited if an attempt were made to introduce a civilian element into the Army hospitals in time of war. Experience has proved the fallacy of this assertion, and there is not a single Army in Europe in which the services of well-trained volunteer hospital assistants would not be received with satisfaction, during a campaign. Members of Red Cross Societies have a well-defined mission to fulfil, and those who understand and act up to this would be the very last to usurp functions which do not belong to them, or in any way endanger the feeling of cordiality with which the military medical profession and the Army hospital corps will be ready to regard them. Whether in peace or war, no man or woman is fitted for hospital work without some previous and special training, and I need scarcely add that strict discipline is absolutely indispensable.

I have endeavoured to direct attention to the increasing activity of the Societies on the continent, all of which are more or less patronised and encouraged by their respective Governments. It would be easy for us to follow their example: but it is this very facility, and the fact that in England all philanthropic movements are due to private initiative, which makes us so indifferent with regard to the future. What the British National Aid Society did in 1870-1 without previous preparation is regarded as satisfactory proof of what it would do if called upon again, for our own or any other Army, but such a precedent cannot safely be relied on.

I venture to say that there is not one of those who responded to the call of Colonel Loyd-Lindsay in 1870, who would not be ready to do so again, if required, bringing with him the experience gained in that memorable year. But this is not enough. The muster-roll of the Red Cross already shows many blanks. Some have passed away, and others are hastening on; new blood is wanted. As we recruit our combatant army, so must we recruit our non-combatant forces. And not only this, it is absolutely indispensable that whilst some direct attention to the perfection of weapons of destruction, others should be occupied in doing all they can to prepare for and mitigate the wounds which such arms are destined to inflict.

As was said by Dr. Landa, the Spanish delegate at the first Conference held at Geneva, in 1863:—"We are apt to accuse war of not allowing the arts of peace to flourish, but peace also, when it is of long duration, makes the art of war to fall into forgetfulness; and it is strange that this same forgetfulness is much greater for all that concerns the arts intended to preserve the Army than for those destined to destroy the enemy. At the decisive moment we ask for a miracle, and as this is not forthcoming, we exclaim against deception, instead of crying out against providence."

Nothing I have said is intended to depreciate in the smallest degree the value of the Army Medical Establishment, and I should not be standing here now, if I thought that one word of mine could seem to disparage the eminent services of this distinguished branch of the military profession.

What better authority can I adduce than that of a gentleman whom I have already quoted? In 1866 Professor Longmore, when advocating the formation of a National Committee in England, said:—"Committees no doubt will be formed, and subscriptions poured in, as has happened hitherto, as soon as there is need of them; but, as heretofore, there will be absence of system and independence of action, and there will not be the advantage, at any rate at first, of Government support; while, in other countries, on war breaking out the necessary preparations will have been long made and fully considered, everything will be systematized on preconceived plans, so as to harmonize with the arrangements of the Government and the action of the combatant and Army medical authorities."

In 1871 Colonel Loyd-Lindsay concluded an interesting account of what the British National Society for Aid to the Sick and Wounded in War had done during the Franco-German War with these words:¹—"Can we wisely or justly decline to do what other nations have done, namely, to appoint National Committees, recognised by Government, whose functions it would be to organize the distribution of the national donations on a sound and proper footing, and thus be prepared to supplement what all admit must greatly need expansion, viz., the medical department of the Army in time of war?"

And in the interval which elapsed between the lecture of Mr. Longmore in 1866 and that from which I have just quoted, Lieutenant-Colonel Henry Brackenbury made an appeal to the British public in the columns of a daily newspaper. He said:—"In Heaven's name, let us be up and doing! We have signed the Convention of Geneva. We are bound in honour to be working in time of peace, not for ourselves alone, but for all the other nations whose wounded may, by even the remotest possibility, ever fall into our hands. We invite discussion and action on a subject affecting both our soldiers' lives and our national honour."

And you, Ladies, who are to be found in every place where there is sickness to relieve, wounds to bind up, or grief to assuage, permit me to conclude in the words used by the Empress Augusta, when taking leave of the General Assembly of the Patriotic Association of Ladies, which is closely allied to the Red Cross Societies of Germany.

Her Majesty said:—"Let us continue to act and to work together in the great task which rests upon us. Let us show during peace the same perseverance as in time of war. Let us have the conscientious conviction that we are devoting our strength to the service of our country, and we shall find in this sentiment our best reward."

The CHAIRMAN: No subject can be more interesting to the Army and to the nation generally than the subject which has been brought before us by Mr. Furley; and it is well known how successful in diminishing the terrible sufferings of war the exertions of this Society have been. I hope that if any gentlemen have remarks or suggestions to make, they will offer them freely to this assembly.

Professor LONGMORE, C.B.: I find myself unexpectedly called upon to make some remarks on the excellent paper which has just been read by Mr. Furley. Unfortunately I did not hear the first part of it, but I know its general tenor. I am quite certain we must all feel very greatly indebted to him if only for calling attention to the necessity of considering our own position in respect to the

¹ See Journal, vol. xv, p. 381, *et seq.*

available means for supplementing the official aid to wounded in time of war. He has shown us what is being done in other countries and has thus indirectly called attention to what is not being done in our own country. There can be no doubt that should war unhappily arise, and there be a necessity for carrying into practical operation, the scheme which has been lately devised for the mobilization of our forces, there can be no doubt that the Army Medical Department will require extraneous help, and that the War Department may well expect to derive some assistance from the "National Aid Society for help to Wounded Soldiers in time of War." By the mobilization scheme, the organization of each corps d'armée requires no less than 267 surgeons with nearly 3,000 men of the Army Hospital Corps. There are eight such corps d'armée contemplated for the defence of the country, and besides these forces there is surgical assistance for the garrisons, for general hospitals, and other establishments to be provided for, as the mobilization scheme contemplates additions to the fighting strength of the regular and Militia forces of the country from the Volunteer combatant forces, so I think the Army Medical Department will have to look for additions to its surgical and nursing staff from civil volunteers. There will certainly be a difficulty in finding surgeons and hospital attendants in sufficient numbers in the usual official way. As far as I am aware, although I have the honour of belonging to the National Aid Society, no scheme has as yet been considered for meeting the wants that will then arise, and I fear the National Aid Society will be looked upon as having somewhat neglected its duty, if it do not in time of peace make some preparation for the demands which are sure to be made upon it in time of war. I believe there are some difficulties from the constitution of the Society in respect to outlay of money; but if Mr. Furley, who has so fully considered the subject, and who is personally so well acquainted with all that has been done in continental countries, and especially with the arrangements between the National Aid Societies in those countries and their respective war departments, would frame a scheme in detail for carrying out a system of training and preparation, in harmony with the peculiar institutions of our country, and would submit the scheme to the Committee of the National Aid Society, I feel confident his scheme would be fully considered, and that, if practicable, the Committee of the Society would do all they possibly could to carry it into effect. I feel as a member of the Army Medical Department that the department itself is indebted to Mr. Furley for calling attention to the important questions which are connected with the subject of volunteer assistance to the official surgical staff of the Army on occasion of war.

Lieut.-Col. HENRY BRACKENBURY, R.A.: I have listened with very great interest to the exceedingly sensible and practical remarks that Mr. Furley has made to us to-day. There are two points of view from which this Red Cross work has to be looked at. There is the point of view of the soldier and the point of view of the philanthropist. I being a combatant soldier by profession, was present as a philanthropist for five months during the Franco-German war, and I am bound to say that in my opinion it is not possible that again in any war the same latitude can be allowed to members of national philanthropic societies as was allowed during that war. I think that the occasions on which that latitude was abused, were few and far between, but I am sorry to say I do know of occasions on which it was abused, and if I were in command of troops, or chief of a staff to a General in command, I would absolutely forbid anything like that latitude which was allowed in the Franco-German war. The want of any recognised understanding as to the position of the agents of Red Cross Societies other than those of the belligerents themselves, led to strange misconceptions. People wearing a Red Cross upon their arm considered themselves almost insulted if they were not allowed to go anywhere and everywhere, and to pass without restraint from one line to another, and their pretensions were often admitted. Application was made by the English National Society for permission to send an agent with medical comforts into Metz during the siege, though we all know that suffering is one of the chief means by which a blockading force is endeavouring to break down the besieged troops. Naturally the permission was refused. In another war these irregularities will not be tolerated; and, therefore, if these philanthropic efforts are to be continued (and I believe it is impossible to overrate the amount of good done by them) it is absolutely necessary that some definite and distinct understanding should be come to by our Government as to

what position the Red Cross Society of our own country as well as those of foreign countries are to be placed in in the event of war. I believe at this moment we are absolutely without any arrangement between the Government of this country and the representatives of the National Aid Society, which has still a very large sum of money in hand: and further the Society itself is without any arrangement as to what is to be done by it in case of war and our own troops being engaged. Nor do I see how it is possible for the National Society to ask the Government to recognise them as long as they have no organization of their own: and we have not got any organization whatever with which to take the field. I believe I have the honour to be on the Council of the National Aid Society; and I own, to my great regret, that we have not stirred one single step since the war of 1870, in the direction of organizing; and until we have done that ourselves, how are we to go to Government and say: "We want you to make arrangements as to our position and sphere of work?" The first thing should be for our Society to go to work and to devise a practicable scheme of action. We have on our Committee such men as Dr. Longmore and Dr. Manley; we have combatant officers who have seen war; we have civil surgeons of the greatest possible eminence; and we have the practical experience of Mr. Furley. Surely amongst us all, we ought to be able to arrange a scheme with which we can go to the Secretary of State for War and say, "Will you go hand in hand with us and help us to carry this out?" If we do that, then I believe we should find at all events that some of the obstacles sure to be put in our way, might be done away with. More than two years before the Franco-German war, my attention was directed to this subject, and I wrote those words which Mr. Furley has quoted to-day, and which are as applicable now as then, "In Heaven's name let us be up and doing."

DR. MANLEY, M.C.: Having been engaged in connection with this Society, I must say the thing that struck me most was the want of detail, the want of organization, and the want of discipline which existed under the Red Cross. That may be excused by the fact that at that time it was a new organization altogether; but still there did not seem to me to be a sufficient connection between the light-field ambulance in the field and the dépôt. For example, after one of the battles, I remember a German surgeon coming into the house where we were and stating that there were 2,000 wounded lying in the villages around, and they had not so much as a piece of bread or a bandage for them. Now seeing what an organization the Germans have, that will tell you what war is, and how the departments must be supplemented, because we find that notwithstanding the most perfect organization, on a pinch of that kind it is impossible that they can do everything. It is therefore most essential that it should be supplemented by a well organized volunteer aid, because as far as my experience goes, it was immediately after an engagement and before the regular field hospitals came up, that the volunteers were of most use. When the field hospitals came up, the Germans immediately took the wounded out of our hands; and we were of no further use except for transporting them. Therefore it is necessary that societies, such as the English Society, should have on its roll an equipment of field ambulance stores, medical and surgical, and provisions for the support of the wounded, and that they should have volunteer aids enrolled and properly trained, because volunteers without organization, though they are zealous and active, have great waste of power and a great waste of material. I should like to ask one or two questions which more particularly affect this country. We have seen how easily ships can be sunk, and no doubt in the first naval engagement there must be several ironclads sunk. Is there any means of saving the wounded from being drowned and of taking them rapidly to England, even before the action is over? have they any plan of a hospital-ship for conveying the wounded? Is there any volunteer staff? because that is a point where a volunteer aid society can come in very well indeed. In the Ashantee war the "Victor Emmanuel" was kept as a hospital ship, but there is nothing of that kind ready for a naval engagement now. I think in that direction there is the promise of a very good work for a Volunteer Aid Society. I mention these facts because I am not aware that anything has been done at all in the society latterly. There is a great field for volunteer aid if properly organized, but there must be discipline and there must be organization and proper attention to detail.

General Sir RICHARD WILBRAHAM, K.C.B.: I wish to make one or two remarks on what has just been said. I think there is great danger of our trespassing upon another department which does not belong to a volunteer society, when it is proposed that the National Aid Society should provide ships to carry home the wounded. It appears to me that if there is one duty more evidently that of the State than another it is that of sending home the wounded. The National Aid Society ought in my opinion to begin with much smaller things than that. There are two questions I should wish to ask the lecturer. We have heard a great deal about what foreign societies of this kind are doing, but we have heard nothing about what our own National Aid Society is doing. I should like to know whether it has ambulances in store or any material with which to take the field, in case its services should be required, and in the second place, as Colonel Brackenbury says, we ought to be up and doing. I want to know whether the National Aid Society has taken any steps to secure the services of experienced surgeons or even of trained orderlies, or whether they would be found as unprepared as they were at the outbreak of the Franco-German War? The best ambulance we had in that war—in which I believe that a number of the members of this Society worked—was, if am not mistaken, one furnished by own Government from Woolwich. I do not know whether there was any ambulance furnished by the National Aid Society. I think we are treading upon very dangerous ground if we are supposing that a private society can, or ought to do the work of Government. Of course our position is very much more difficult than that of a similar society in any foreign country. The natural duty of such a society would be to assist and supplement the military organization of their own country. One of the speakers has expressed his opinion that the work of this society would have to encounter the jealousy of the War Office. I do not think that there would be any fear of this, if their services were required in our own country. But I think that there would be great fear of its incurring the jealousy of the military authorities of any foreign country to which it was giving its services, unless the utmost prudence were exercised.

Admiral Sir HENRY CODRINGTON, K.C.B.: I must say I think there is hardly so much field for the exertions of the society in the Navy as there would be in the Army. In the first place, I do not think that our number of wounded would be so great, nor would they be so dispersed as in warfare on shore. It is suggested that aid should be given in the case of ramming, and that the wounded should be disposed of; I am sorry to say in that view it is not only the wounded that would be disposed of, the ship herself and all on board of her would be disposed of also. Next, with respect to the surgical care of those men who happen to be unluckily wounded, the medical staff, I think, would be sufficient and it would be supplemented very largely by the civilians on board the ship. They are the assistants of the medical profession in the cockpit, and wherever else the wounded may be. I do not think there is such urgent necessity for increased surgical assistance in the Navy, but if there were, I do think it would be the duty certainly of the Government to provide it, and I do not think really and truly there is any means for that assistance being given in each particular case by any civilian society. Next, as to transporting the wounded home. Certainly that is a thing we in the Navy ought to do; but there is a very great difference between picking up wounded men from a field and hoisting men out from one ship in the middle of the Atlantic and transporting them into another, even supposing there were neutral ships to receive the wounded. Again, if a ship has been in action, I think she will very shortly go into harbour if she swims, and more particularly as warfare now will always be carried on by means of steam propulsion, for no war-ship could be kept out of her harbour after action more than a few days, certainly not weeks, and it might be very dangerous to move a recently wounded man from a ship immediately into another ship. On the whole, therefore, I do not see any field for a society of this excellent nature to be brought to bear upon the Navy as it is now constituted, and as it will be in any future warfare in which it may be engaged.

Sir EDMUND LECHMER, Bart.: I must express my acknowledgments to the Council of this Institution for their kindness in giving me an opportunity of hearing Mr. Furley's very valuable paper, and I may be permitted as a civilian to express my hearty concurrence in what has fallen from the previous speakers. It has always been a

great cause of surprise, and some disappointment to me, that more active steps have not been taken by the Red Cross Society, following in the steps of other branches of the same organization abroad, to carry on in times of peace some corresponding services to those required in war. I cannot conceive any great difficulty which would arise in taking such steps, and I can only suppose that the state of quiescence in which the Society has remained in England has arisen from the belief that everything was right and proper, and that in time of war the skeleton would be filled up, and the Society might resume the field with the same activity it before manifested. But I cannot help thinking, after what we have heard, that this is a mistake. I think also there has been great disappointment in the provinces on this question. I can only say that in our own county of Worcester very active steps were taken to raise a very large sum of money and a considerable amount of *matériel* during the Franco-Prussian war, and it was looked upon that our Worcestershire branch of the Red Cross Society would be a permanent institution. The subscriptions were kept up, and all our books are ready, and the storekeeper is ready at any moment to set to work in the Town Hall of Worcester, and to take active steps to carry on the work of the Society. I believe, if the effort were made, a great amount of good might be done, not only in reviving the spirit, which ought not to subside in times of peace—the spirit of philanthropy, which was so conspicuous at that period, and which proved so valuable in time of war—but I believe also the National Society might gain valuable experience by subsidizing some institutions for nursing the sick poor and for training nurses for the sick—those societies that take upon themselves the conveyance of the sick to hospitals. I am happy to say the English Branch of the Order of St. John of Jerusalem has taken upon itself the provision of means for the conveyance of persons to hospitals who have been wounded in such accidents, and I really believe that by giving encouragement to this or similar hospital organizations, a great deal might be done to keep up an organized staff of philanthropists, who might by proper discipline (and discipline is everything) become very valuable in any future war. I therefore hope that what has been said to-day may call the attention of the Council of the English Red Cross Society to the real advantage—I might almost say the duty—of utilizing to some extent the great resources which the country has placed in their hands; and by calling to their aid the admirable body of men who have been active members of that society, they might readily frame a good and practical scheme for some useful and national work.

Sir EDWARD PERROTT, Bart.: With regard to the observations that have fallen on the subject of abuses under the Red Cross cognizance, it has appeared to me very often that there is not sufficient executive power given to medical officers in general. We know that at the moment the medical officer goes to a military parade his mouth is closed.

The CHAIRMAN: I think that is perhaps a little beyond the question before us to-day. I hope you will not go into the general question of medical authorities with regard to the War Office or the Commander-in-Chief.

Sir EDWARD PERROTT: Not in that point of view, but it is with a desire of seeing whether these abuses which have been referred to would not have been controlled if the medical officer in charge of parties under the Red Cross cognizance was enabled himself to be accountable for every man that would be present and claim to be under that badge.

Deputy-Commissary J. S. YOUNG: I am sure every one must be indebted to Mr. Furley for calling attention to the humanitarian movement which had its origin in 1870 and 1871, and which, I think, has lain too long asleep. The only fear I have from what has come out of the discussion to-day, especially from those who hold a position in the Army at present—Colonel Brackenbury and Surgeon-Major Manley—is that the object of the lecturer, which is the benefit of the sick and wounded in time of war, will be frustrated if the responsibility of the Government itself is not fully brought forward. It seems to me that if we are to leave so much to the National Society for Aid to Sick and Wounded, Governments will be very much tempted to leave aside the proper provision that they ought to make for aid to their own sick and wounded in time of war. A distinguished Officer, who was a governor of one of our largest medical establishments, has spoken, and it is within his recollection, I dare say, that a Royal Commission sat in consequence of the disastrous

state of affairs in connection with the sick and wounded of the army in the East in 1855 and 1856. The outcome of that Royal Commission was that the executive of the Army was so strengthened that in all our recent expeditions, at any rate, there was no necessity for aid to the sick and wounded from outside the Army itself. I am very much afraid, if too much prominence is given to voluntary effort that a reaction might take place. A re-action has already taken place, I am afraid, as regards the executive branch of the Army charged with the welfare of the sick and wounded in war. At the same time I cannot agree with Colonel Brackenbury that it is necessary to regulate these things, as regards the National Aid Society, so closely as to bring it into official relation with the executive of the Army. The old proverb that "Necessity knows no law" holds equally good with reference to any great war; that where there is a necessity then there will be a gladness to accept the efforts of voluntary societies, and so long as the action of the National Aid Society is confined to that, I think there will be more than an ample sphere for their efforts, as there was in 1870 and 1871. Surgeon Manley referred to efforts in connection with ships at sea. I cannot fancy that being the sphere of a National Society at all, for the simple reason that you cannot guarantee for a National Society that there will be the funds necessary. It takes an immense amount of money to have a ship and keep it at sea for any indefinite period. It is the peculiarity of the circumstances connected with aid to the sick and wounded that everything is unforeseen; for instance, we know that the supply of an army is a question to the commissariat of how many effectives they have to supply. This is a matter which can be dealt with to a degree of accuracy, but when you come to sick and wounded, they never know how many they have to supply and it is in the time of these unforeseen emergencies that the aid to sick and wounded will come in most efficiently. Having had some experience, and having served in the service of the National Society, I feel that we have not heard the other, the official, side of the question. His Royal Highness, at a recent meeting in this theatre, stated that people by their absence sometimes seemed to take for granted that everything was all right. I hope that those present here will attend at the lecture to be given on the 29th instant by Surgeon Sandford Moore, a distinguished Officer of the Medical Department, and who also served during the Franco-German war, and then they will be able to hear the official side of the question. I am perfectly sure that with the special attention that has been given to the subject by the lecturer, and that which will be given to it by Surgeon Moore, some good ought to result.

Mr. SHEE: During the German war my brother-in-law, Baron von Lauer, was engaged in building a harbour for the German Government. Finding his civil career temporarily suspended, he set about organizing voluntarily, in conjunction with those under him, a service corresponding somewhat to that which came to the aid of the military, and accordingly there was inaugurated a new branch which, considering the position of Germany as a naval power, certainly might put us to shame. It went by the name of the "See-wehr," or Naval Militia, and did good service in protecting the harbour and also in coming to relieve the sick and wounded. I mention this in corroboration of the remark made by Surgeon-Major Manley, and my belief is that if Germany, taking so humble a rank as a naval power, thought it worth while, under a stress of circumstances unparalleled, to do something in the direction mentioned, then surely it might be for our own advantage and ultimate good were we to follow the example thus given us.

Dr. DANFORD THOMAS: I was six months, during the Franco-German war, engaged by the Society, and the thought that has struck me, after what I have already heard to-day, is that our Volunteers in this country are without any medical organization whatever for time of war. They have their surgeons and their assistant-surgeons, but there is no organization at all for taking charge of the sick or wounded, nor are there any ambulances for that purpose. This large body of men if brought into action would be entirely destitute of medical provision and service in time of war, therefore if a Red Cross Society did nothing else but support our own soldiers in time of war, that would be in itself one great reason why a thoroughly organized system should be adopted. The only difficulty in this plan would be if our assistance as an International Society was required for other countries. If we confined our Red Cross services to our own country, there would be little or no difficulty in

organizing ambulances to attach themselves to the various regiments of the volunteer service, where they might be properly trained and really rendered efficient for any emergency.

The CHAIRMAN: There is one point I should wish to refer to, which is a military one. I certainly must endorse the feeling about there being a limit and a distinct limit to the presence of the Red Cross, and the facilities of getting about and using the Red Cross in a way that General Officers, perhaps, must object to. It is a very difficult duty to be obliged to say that what is nominally for the assistance of the sick and wounded is something that is positively noxious to your own Army, perhaps, by information or facility being given to the enemy, and must be prevented. Therefore, I cannot but feel that that is a very strong point that has been mentioned by Colonel Brackenbury, and one on which it would behove the Society itself to get the most stringent rules laid down in order that they may be protected in their real legitimate duty, so as to draw a line and prevent any illegitimate entries into fortresses or communication being made which would put a stop to the real well-doing and well-being of the Society itself. It is a very important point for us to consider, and they must feel that there are occasions in which it is possible that the Red Cross may be abused. Of course, every enemy will take advantage of getting information and using even the most legitimate means in an illegitimate manner—the old story of “all fair in war,” you go very near the wind in many things of that sort—therefore I think the Society should lay down its own rules strictly so as to support the real authority of a General Officer, so that he may be able to give them the utmost protection with safety to his own Army. I will leave it to Mr. Furley to enter into the other questions with regard to the Society itself.

Mr. FURLEY: I do not think that there is much more I can say on the subject. Dr. Manley's proposition as to a scheme of relief in naval warfare has already been brought forward at more than one conference, and the French Society, as you, perhaps, have noticed, calls itself *Société de secours aux blessés des Armées de Terre et de Mer*. I think that societies rather shirk this question because they see the difficulty Sir Henry Codrington has alluded to. In 1868 I was asked at Berlin if I could do anything in England towards this object, because it was thought of all countries in the world England was the one which ought to initiate this branch of relief; but I very much doubt if there is any one in England who sees a way to any practical scheme of relief for the wounded at sea. In fact, I believe the majority of naval men are quite satisfied with present arrangements. At the same time, I hope the question may be ventilated at the next Congress. Sir Edmund Lechmere has alluded to what might be done in time of peace. I feel very strongly upon that subject. I think our starting point should be the connection between the Society and the British Army. The work that the National Society ought to undertake should be of such a nature as to be useful to hospitals and nursing establishments in time of peace. If then we are required to aid our own Army Medical Establishment, or to render any assistance to foreign Armies in supplementing their medical establishments, we shall be ready, if called upon, to do so. I do not think there would be the slightest difficulty if there was a proper organization connected with our civil hospitals in time of peace, such as you find in Germany and elsewhere. Professor Longmore has suggested that I should draw up a scheme. I confess I prefer that it should be done and drawn up by a man like himself. I will gladly give any assistance I can, but I think there are men much better fitted than I am to take the lead in such a matter. I should not shirk from any labour it might entail, because I think it ought to be done.

General WILBRAHAM: I asked two definite questions; whether Mr. Furley considers they come within the scope of his lecture may be another question. First, has the National Aid Society a store of ambulances and material ready to take the field? and, in the second place, in the event of their being called upon to take the field, have they made any sort of arrangement by which they could secure medical aid and the assistance of trained hospital nurses?

Mr. FURLEY: Having been very much out of the country of late years, I am not aware that we possess any material at all. I believe we have two or three ambulance carriages presented by the French Society to us after the war, but Dr. Manley knows more about that than I do.

Mr. LONGMORE: I am sorry to say the Society has no *dépôt* of stores, and, secondly, that as far as I am aware it has not made any preparation for meeting the demands which may be made upon it in time of war. I would also, as I have been called upon to speak again, merely call attention to one fact which has scarcely been alluded to, but which has an important bearing on some of the observations which have been made. Colonel Brackenbury mentioned that a great number of irregularities took place under the Red Cross during the Franco-German war. One irregularity is sure to lead to other irregularities, and I must say that in the very first place the fact of our National Aid Society interfering at all in that war was in itself an irregularity. There is no treaty or legal enactment by which our National Aid Society could under any circumstances rightly assume to itself an international character, or by which any English person under any circumstances could claim a right by virtue of being a member of a Red Cross Society to be on or near a field of military operations in which foreign nations only were concerned. The Geneva Convention simply legalizes and recognizes in each country a National Aid Society, and that National Aid Society has no standing whatever until it has received the sanction and has come more or less under the authority of the Minister of War of that country. The Convention of Geneva most strictly excludes all reference to independent volunteers. There is no mention of a volunteer, separate from the military ambulances and hospitals of the belligerents, in the treaty from beginning to end; and, having taken part in framing the terms of the Convention, I know for a fact that so general was the feeling for excluding such persons, seeing the utter impossibility, without grave irregularities ensuing, of giving anybody who might choose to take it the right as a volunteer to be on the field among combatant Armies; that had volunteers, independent of nationality and military control, been introduced into the articles, the Convention would never have been acceded to. Indeed, with regard to the French representatives who were at the framing of that Convention, they mentioned that they had distinct orders if the word "volunteer" were introduced into the treaty that they were immediately to leave Geneva, and to take no further part in the proceedings. Those who will study the Convention of Geneva carefully will see from beginning to end there is not a single allusion to Red Cross volunteers in it. The National Aid Society, when properly placed under the authority of the Minister for War and duly recognised, becomes for the time as much a part of the medical department of the Army as the combatant volunteers are of the fighting ranks, and the properly accredited members of the society then become entitled to certain privileges, which privileges are laid down in the Convention of Geneva. The real problem which remains to be solved in this country, and which in my opinion ought to be solved without delay, is how on the one hand to preserve the general volunteer character of the National Aid Society, and on the other to consider how it can best be subordinated to the established military authorities, so that there may be no clashing with good order and necessary discipline in time of war; but, on the contrary, efficient co-operation towards the common end in view. It is the same problem that has had to be worked out with regard to volunteer combatants.

The CHAIRMAN: I am very glad Mr. Longmore has mentioned this, for I myself to a certain extent was ignorant of the various details. I understand Mr. Longmore to say that those under the Convention of Geneva must be backed by the Government in order to be recognized by the belligerent forces.

Mr. LONGMORE: Quite so.

The CHAIRMAN: I am very glad these few expressions have shown exactly the *status* of the Red Cross Society when war takes place. We have had a very interesting lecture from Mr. Furley, and the subject is most interesting both to the civil and more especially to the military population of England, who have to suffer during war in this terrible way on the field. The main point I cannot help thinking, is the relief of the wounded on the field; that non-combatants should be attached to each company to carry the wounded from the place where they fall to a place of temporary safety, and then to convey them to hospitals. That is the main point which every General Officer would wish to see carried out in the Army, and these are subjects that are debated and discussed with very great attention by military men. I am very glad that the subject has been brought forward here, and beg to offer Mr. Furley our best thanks for his very interesting lecture.

Ebening Meeting.

Monday, May 29th, 1876.

LIEUT.-COLONEL R. J. LOYD-LINDSAY, R.C., M.P., in the Chair.

NAMES of MEMBERS who joined the Institution between the 2nd and 29th May, 1876.

LIFE.

Carington, C. R., Lord, Capt. Royal Horse Guards.

Willis, G. H. S., C.B., Major-General, Unatt.

Aitchison, H. C., Commander R.N.

Wauchoppe, A. G., Lieut. 42nd Highlanders.

Alves, W. L., Lieut. R.A.

ANNUAL.

Goold-Adams, F. M., Lieut. R.A.

Harrison, Wm., Capt. 19th West York R. V.

Smyth, H. F., Capt. R.A.

Holt, G. Trefusis, Capt., late Indian Navy.

ASSISTANCE TO THE WOUNDED IN TIME OF WAR.

By Surgeon SANDFORD MOORE, M.B., F.S.S., Instructor, Army Hospital Corps.

My subject this evening is "Assistance to the Wounded in Time of War." The question of how to make adequate provision for meeting the requirements of the wounded of our own Army, in the event of a European campaign, and to which my remarks will chiefly refer, opens up a field regarded at once as so large and so complicated that I feel I owe an apology for presuming to deal with it, in any way whatever.

Since the year 1870-71, when it was my privilege to serve with Mr. Manley's division of the so-called Woolwich ambulance in the Loire campaign, and to be an eye-witness of the prompt relief afforded to the wounded by the excellent system of field hospitals in use in the Prussian Army, I have been deeply impressed with the importance of the subject, so that, on recently being asked by the Council of the Royal United Service Institution to read a paper embodying my views on the subject of help to the wounded, although the time for preparation placed at my disposal was short, I determined to try and do so.

It is very generally admitted that, in all Armies, the most defective portion of the field arrangements, and that which has shown least signs of progressive improvement, is that which concerns the medical service. Nor, in one way, is this altogether a matter of surprise. In the words of Mr. Longmore, "The community at large are deeply interested, when attempts are made to improve the destructive implements of war, and to ascertain the most effective employing them, for it is felt that power as well as power is involved in their possession, but it is a comparatively short time since attention was first directed to the improvement of the medical service."

"means of meeting the pressing necessities of those disabled by the effects of war, and even during the interval of time which has since elapsed, interest in the question has been limited, with comparatively few exceptions, to the persons officially concerned with the special duties belonging to it." These remarks were originally made with special reference to transport of the wounded, but they apply, with equal force, to all field medical arrangements generally.

It is probably unreasonable to expect people to busy themselves with a subject which affords such dry and uninteresting materials, and which does not press home to them until war breaks out, when, too late, the picture, with all its attendant horrors, is held up for their inspection. The solution of the problem at any time is attended with difficulty; then it is impossible, or well nigh impossible. The question is principally one of men, "How form an adequate reserve of trained surgeons, carriers, and nurses, ready to serve when wanted, and ready to find employment for themselves when their services are no longer required by Government?"

The *personnel* required for attendance upon the wounded in war-time forms a body, whose numbers are largely in excess of those required for the peace establishment. Approximately, more than eight times the peace establishment would not over-estimate the strength of the reserves required to enable the work to be done efficiently; and it will be shown, further on, that it is desirable that all who are intended for this service should receive a course of special instruction such as will fit them for the important duties required of them in campaigning.

The requisite amount of reserve *matériel* does not present nearly the same difficulty as the *personnel* does. In well-organized European Armies the sick and wounded are sent to the rear as fast as possible. In all such evacuations common country carts and waggons, and railway waggons, take the place of specially constructed sick-transport conveyances, the use of the latter being restricted exclusively to the battle field and its immediate vicinity.¹ A slight increase in specially constructed ambulance-conveyances would, however, doubtless be necessary over and above the peace establishment.

To form the reserves and construct whatever proportion of ambulance-conveyances may be necessary requires a certain expenditure—and any Government which undertakes the task of bringing an incomplete medical department up to a war footing must be prepared to incur expense—an outlay, too, for which a return seems so far distant that,

¹ As an instance of evacuation by country carts, I may mention a Prussian evacuation of wounded from Moree to Chartres, at which, by Mr. Manley's orders, I assisted in December, 1870. I brought with me three ambulance-waggons of the National Aid Society; the Prussians had forty and odd common country carts. On the 20th, at noon, we commenced to load our waggons, and took up 260 wounded; with these we marched to Cloyes, at which place we arrived at 2 A.M. on the 21st. The wounded were there placed in the Mairie for a few hours' rest. At 2 P.M. we started for Chartres, which place we did not reach until 6 A.M. on the morning of the 22nd—a distance of not much under sixty-five English miles in less than forty-eight hours, including halts.

to many in peace time, it would no doubt appear to be quite uncalled for, if not unjustifiable; and, although no serious person probably could be found in any country to dispute, for a moment, that the nation is not under an absolute obligation to provide for the wants and proper care of its wounded soldiers, still the fact remains that, from some such cause or causes as are above enumerated, the army medical service in many countries—in nearly all—remains in an imperfect condition, being, from its inexpansibility, quite unable to respond to the calls made upon it in war-time.

The history of international philanthropy has clearly demonstrated that, not only has the defective nature of the official medical arrangements generally been recognised, but that strenuous private efforts have persistently been made to provide a remedy. In 1863, we had National Committees formed for the express purpose of becoming the agents of the public at large for supplementing the regular hospital service in war-time. In 1864 was signed the Geneva Convention, having for its object the neutralization of the wounded of belligerent Armies, and the *matériel* and *personnel* necessary for their care and treatment—a further step in ameliorating the wounded soldiers' condition and materially lessening his misfortunes—and since that date, whenever hostilities have occurred to interrupt the peace of Europe,—in Schleswig-Holstein, in the Austro- and Franco-Prussian campaigns,—the National Committees have irrefutably proved, by their career of usefulness, not only how invaluable their services were on these occasions, but also, in proportion to the amount of work done, the existence of gaps in the official medical arrangements of the contending forces.

In the Franco-Prussian war, in the early part of the war, had the arrangements been satisfactory, Sir H. Havelock would not have had it in his power to write from Pont-à-Mousson, on the 21st of August,—“It makes me sick at heart to see the scenes of suffering that cannot be relieved, first, from want of appliances, next, because surgeons are too few for the work. All the French wounded have fallen into the hands of the Germans. There are actually numbers of wounded, struck on the 16th and 18th, who have only had their wounds dressed on the field when hit, and never since.” Under the Geneva Convention every facility was given for a portion of the French medical service being left behind to look after the French wounded who fell into the hands of the enemy on this and other occasions. Two circumstances may have assisted in causing this omission—one, the now notorious state of ignorance of the Officers and men of the French Army concerning the purport, or existence even of the Articles of the Geneva Convention, and the other, a short-handed medical service. Both may have had a share in its production, but I am inclined to think the latter.

Even the Prussians, with their wonderfully arranged organization, succumbed here and there to the press of difficulties. Medical aid was wanting in the first battles, although, at the beginning of the war, they had enrolled 2,700 surgeons, and provided hospital effects for 40,000 beds.

At Saarbruck the natives, for two whole days, drew the wounded from the field in country carts, and brought them to their homes.

After Weissembourg, some of the wounded lay for two whole days where they fell, and in Remilly, writes M. Pirogoff, a street was pointed out in which 1,000 wounded were laid down, having been travelling thither for two days and two nights from Gravelotte. "From the scene of action at Metz," the same writer remarks, "3,000 wounded were sent to Gorze, where Professor Langenbeck with four assistants was, and such was the pressure that they could only receive the most necessary dressing, prior to being passed on to places of greater accommodation."

The medical service of the Armies of Europe when in the field is conducted upon one or other of two general principles. One principle, the more modern, is the principle of separating the wounded from the moving force, then isolating and distributing them. For this, a system of field hospitals is requisite. The other principle is the principle of conveying the wounded in company with the moving force. For this, a large ambulance transport is requisite. The former is the one on which the Prussian medical service is conducted, the latter is the one on which the British medical service has hitherto been conducted, and which, to a certain extent, in so far as one can judge from the autumn manœuvres and in the absence of any late experience of British troops in a European campaign, is interwoven with our military system in the present day. For example, we read in accounts of the Peninsular campaigns that it was the duty of the principal medical officer to see that, however short a time a battalion or corps rested in a place, a regimental hospital was established; indeed, as it carried with it medicines, bedding, stores, and all the materials of a hospital, a regiment might be said to have its hospital established even on the march. It was frequently established in the face of an enemy, and nearly within reach of his guns. By this system as few men as possible were separated from the moving force, and these, the most severely wounded only, who were sent back, on any available transport, commissariat carts, bullock carts, &c., to the nearest town where a general hospital was established. An attempt was not made, at any time during the Peninsular war, to establish field hospitals, by which means the principle of separation can be effected. In the Crimean war there was no opportunity of introducing a system of field hospitals, for then the Army was stationary, or nearly so, and close to its base. In India, the transport, &c., is so different to that required at home, that the methods in use there cannot be applied to European campaigns, while for each of our little wars special arrangements require to be made.

An American surgeon of great experience remarks, "By a rapid dispersion of the wounded the fighting force is less diminished than by any other plan. Fewer combatants are withdrawn from their proper duties to attend to their sick and wounded comrades. The number of sick and wounded engaging in fresh active service will be greater by this arrangement than by any other, provided that there be such an enforcement of discipline in the base hospitals as

"will ensure the prompt return of convalescents, and large accumulations of hospital supplies with the Army become superfluous. Lastly, the most important consideration is the most obvious, the distribution of sick and wounded prevents the generation of those pestilences that are the greatest scourge of armies. The sick and wounded avoid infecting each other, and those who are well escape contagion."

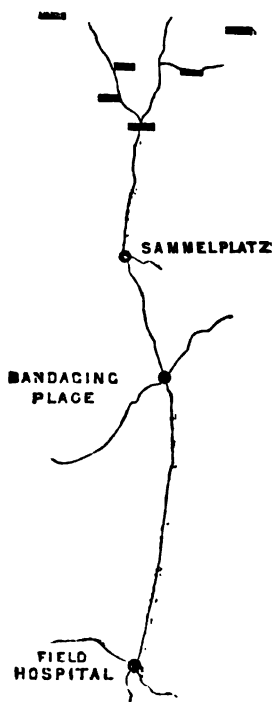
The converse may be expected where accumulations of the sick and wounded are formed and carried with the marching columns. The presence of such accumulations will depress healthy comrades, and may even influence the progress of the campaign, for advantages attained by a rapid onward movement of the force cannot be expected to accrue while it remains encumbered with long convoys of sick and wounded. The enormous number of ambulance-waggons, vehicles specially constructed for sick-transport, and of little use for other purposes, required when this principle is adopted, is another very serious objection. For example, in the British Service, 27 ambulance waggons are required per brigade, but only six per division of two brigades in the Prussian Service, or an economy in these vehicles of about 90 per cent. The six Prussian waggons are supplemented by four movable field hospitals (800 beds), with a reserve of two field hospitals (400 beds), which afford temporary ward-shelter to the whole of the wounded who are not able to make their way further to the rear, and until such time as they can be removed, while the 27 British waggons are supplemented by two field hospitals, with a reserve of one and three-quarter field hospitals, in which only the very severely wounded are afforded ward-shelter until their removal to some garrison hospital in towns in the rear, while the remainder of the wounded are carried on with the moving force.

And at this point I would ask permission to describe briefly the Prussian arrangements for the care and removal of the wounded, and for this I shall borrow largely from Dr. FitzGerald's excellent report on the subject. I am no advocate for Prussianising our medical department unless it can be clearly demonstrated that we should be decidedly benefited by the change. Personally I believe the Prussian system could be modified so as to be made applicable to the British Service. Certain I am that on the whole it worked remarkably well in 1870-71. Its sanitary detachments are spoken of by both Prussian Officers and men in the very highest terms of praise, and are of such recognised proved utility that their number is to be considerably increased for the future.

A Prussian battalion takes the field with a medicine cart, and a few stretchers, and a proportion of surgeons and auxiliary bearers—two of the former and four men per company of the latter. The battalion carries with it no regimental hospital equipment, nor any equipment for opening a detachment hospital.

In minor actions, first assistance to the wounded is given by the battalion surgeons and auxiliary bearers. Both advance with their battalions under fire, and tender what aid they can to those who fall. The medicine cart and stretchers are advanced as far as possible, and

"bandaging places," as shown in the diagram, are formed just beyond rifle range under the orders of the Officer commanding. The auxiliary



bearers then carry back the severely wounded, who are unable to walk, on their stretchers to the bandaging places. Care, however, is taken that the bearers do not congregate there, but return forthwith to the front as soon as their stretchers are unloaded. The senior regimental surgeon conducts these "bandaging places." Injuries are there examined, dressings applied, and the necessary surgical operations performed; and, moreover, measures are taken for the removal of the wounded, when dressed, to shelter, where they are to receive such further attention as they may require until removed to the *etappen* or field hospitals. For these slight engagements, the ambulance waggons are not brought up, nor are the field hospitals unless by the special requisition of the General commanding the division.

If the engagement becomes general, other arrangements than those above enumerated are made. In such a case the sanitary detachments and field hospitals, which follow the advancing Army as closely as possible, are then thrown forward, the sanitary detachment to replace or supplement the auxiliary bearers in carrying the wounded off the field, and the field hospitals to provide the temporary ward accommo-

dation for the wounded, which it is absolutely necessary for them to have until their farther removal to base hospitals in the rear.

The composition of a sanitary detachment is shown in the table below.¹ It is made up of a certain fixed proportion of ambulance-carriages and store-waggons and ambulance equipment, as well as surgeons, bearers, nurses, and Train soldiers, the duty of the latter being to act as grooms, drivers, &c. There are three sanitary detachments to each Army-Corps. One is permanently attached to each of the two infantry divisions, and the third is held in reserve at the disposal of the General commanding.

To provide ward-accommodation for the wounded forms no part of the functions of the sanitary detachment. Its duties simply embrace the formation of bandaging places, and the collection and removal of wounded from the field of battle; and on the forward movement of the Army after a battle, it, or at least one section of it, quickly follows its division. The ambulance waggons are at no time used for the conveyance of sick or wounded on the line of march, or in camps, nor are they ever employed in evacuations of sick or wounded.

The Divisional Commander issues the order for the movement of the sanitary detachment into action, and fixes upon the points where the bandaging places shall be established, appropriate buildings being utilised if such exist, if not an operating tent is pitched in the most sheltered situation. These are to be denoted by the Red Cross Flag, and after dark by a red lantern.

Here the ambulance surgeons and a proportion of the regimental surgeons are assembled, the store waggons unpacked, chloroform and dressings got in readiness, and the arrival of the first party of wounded from the fighting line awaited, these soon begin to arrive, those able to walk first, those severely wounded carried by the bearers on stretchers. In the mean time, while this is being accomplished, the ambulance waggons and bearers, led by their Officers, are to be pushed forward by the best road available to the sammelplatz (shown in the diagram), the furthest point to which it is considered

¹ *Sanitary Detachment.*

<i>Matériel.</i>	<i>Personnel.</i>
2 sanitary waggons.	1 first lieutenant.
2 baggage waggons.	1 second lieutenant.
6 ambulance waggons.	1 paymaster.
42 stretchers.	1 sergeant-major.
3 wheeled stretcher-supports.	12 under officers.
	12 corporals and second-period men.
	124 sick-bearers.
	1 first staff surgeon.
	1 second staff surgeon.
	5 assistant surgeons.
	1 field apothecary.
	2 upper hospital attendants.
	6 hospital attendants.
	8 hospital orderlies.
	3 train corporals (mounted).
	3 train under officers (mounted).
	23 train soldiers.

expedient to bring ambulance waggons. There the waggons are to be drawn up and reversed, and the bearers hurried forward by their Officers to search for and collect the wounded. The surgeons at the bandaging place are formed into three divisions by the Directing Surgeon.

The *first division* regularly examine all who arrive. Those with slight wounds are dressed and sent further on. The mortally wounded are placed aside in a sheltered spot, as further removal would augment their sufferings.

The *second division* apply difficult bandages, plaster of Paris, dextrine, &c., for fracture cases.

The *third division* undertake the performance of all capital operations which must be performed without delay. A "diagnosis tablet" is then attached to each man's clothes, recording the description of the injury and other particulars, which are of great utility in preventing repeated examinations by successive surgeons, into whose hands he may pass, and facilitates the distribution of the wounded in directions and to distances suitable to their injuries.

The Directing Surgeon then settles the further distribution of the wounded. The slightly wounded are sent to the *etappen* hospitals, the remainder to the field hospitals; the most severely to the nearest, and those able to walk on foot; those unable to walk, by the ambulance waggons. This course having been followed, the sanitary detachment is ready to march after its division. If a retrograde movement has to be made, the Directing Surgeon arranges who of the medical officers and subordinates, as well as what stores, shall be left behind with the wounded.

To afford the requisite temporary ward-shelter, there are twelve field hospitals to each Army Corps, four attached to each of the divisions, and four held in reserve. Each possesses its fixed establishment of surgeons and subordinates, stores, transport, and equipment, and being extremely movable, can rapidly follow the advancing Division or Army Corps. These field hospitals are opened in towns, villages, and detached buildings in the vicinity of the operating force. As few as possible are brought into activity at a time, the rest are kept packed and ready for a sudden move. When a general engagement is expected, farm-houses, &c., are selected, as near the bandaging places as possible, and are made comfortable, as the wounded may have to be detained there a few days or longer, every effort being made to transfer them to the reserve hospitals as fast as their condition admits. When a field hospital cannot be evacuated, it ceases for a time to belong to its own Army Corps, and is associated with the *etappen* system. As soon as it is evacuated it is free to move to rejoin the corps to which it belongs. The *etappen* hospitals, to which allusion has been made, are situated along the line of communications, about 100 miles apart on lines of railway, or 20 miles apart on the *etappen* roads, and form resting-places for invalids returning home. The reserve hospitals are formed for patients evacuated from the field- or *etappen*-hospitals, and exist during the whole time of the war.

Under this system, during the removal of the wounded man from

the place where he falls to his own town hospital in Germany, his safety is intrusted to two distinct classes of subordinates, and I desire particularly to draw attention to this division, as I am convinced that therein lies the key to any thorough plan for assisting the wounded in war time.

The two classes are—

1. Bearers.
2. Hospital-orderlies, or nurses.

The duties of bearers may be summarized thus: they search for the wounded during and after an engagement, and administer water or other refreshment to them. They examine the whole of the fallen, and separate the living from the dead. The living are then removed either to the sammelplatz, or if there are no ambulance-waggons available there, to the nearest bandaging-place. They assist in loading the waggons and wheeled stretchers at the sammelplatz, and immediately return to the front to search for other wounded. Four bearers form a stretcher-party, two to carry the stretcher, and two to act as a reserve, and carry accoutrements, packs, &c., not only those belonging to the wounded man, but any stray ones lying about the field. Cases of emergency, such as hemorrhage, &c., are to be treated by the bearers, but only in the unavoidable absence of the surgeon; and, lastly, the bearer company is required to find a guard for its stores and waggons on the line of march, and at the head-quarters of the sanitary detachment.

For the performance of such duties as these it will be obvious that skill, powers of endurance, intelligence, and courage require to be combined in no small degree in one and the same individual, but above all, that bearers must be disciplined, not necessarily highly trained, troops. The duty is at times dangerous and fatiguing in the extreme. Again and again has the bearer to cross and recross the zone between the fighting line and the sammelplatz or bandaging-place—the zone in fact of rifle fire—it may be each time in doing so exposed to great risk. I think, therefore, it will be readily admitted that no other than a corps with a distinct military organization need attempt to discharge such duties, and in such a situation. It requires Officers and non-commissioned officers, who themselves understand the details of the work the bearers will be called on to perform, and who appreciate the necessities they will have to meet, to command, and soldiers, masters of the details, to execute the commands. A body of trained civilians may be perfect in every respect but the one, but without strict rules of discipline must speedily become a disorganised mob on the battle-field. I do not, however, wish to be understood to say that under no circumstances could trained civilians be made to supplement the military establishment. Instances must of course again occur when after the fighting has terminated, the military establishment finds itself unable to cope with the large numbers of wounded still remaining on the field; then, of course, there would be nothing to prevent the employment of trained civilians to any extent that might be thought necessary. But these instances are exceptional, and besides there must always be a difficulty in assembling a body of civilians, whose presence for all other purposes would be positively

hurtful in the front, and in timing them to arrive on the battle-field exactly when their services were most needed.

That the work the bearer has to perform is sufficiently irksome and fatiguing, and demands considerable powers of endurance, will be manifest from a simple calculation, which I extract from an excellent translation of Surgeon-Major Alcock's. For each severely wounded man four stretcher-bearers are required in the Prussian service, and as the sammelplatz, or point where the ambulance-waggon's are drawn up, cannot be established nearer the fighting line than half a mile, it follows that to bring in ten men the four bearers must walk ten miles, and to bring in 1,000 men will therefore require 400 bearers at the lowest calculation, and this, too, assuming the most favourable conditions, viz., that the line traversed between these two points is the direct line, and that the bearers are not obliged to turn aside through unevenness of the ground, &c. The same writer, referring to the earlier battles of the war, makes the remark:—"In the Prussian service, as only 400 bearers were allowed to each Army Corps, it is easy to understand why the wounded lay whole days and nights upon the field of battle." This the Prussians intend to rectify, as has already been mentioned, by increasing the number of sanitary detachments.

Bearers are selected in the following manner in the Prussian service: two men per infantry or Jäger company of two years' service are trained annually during the winter months as bearers, and out of these the sanitary detachments are formed in the event of war. The auxiliary bearers, to the number of four men per company are trained in the same manner and at the same time. On the termination of the period of training the bearers return to their duty in the ranks of the army.

I would next request to be allowed to glance at the training given to the Prussian bearer. It is partly theoretical and partly practical. The *theoretical* includes a slight knowledge of such subjects as anatomy, gun-shot wounds and their immediate attention, of appliances used in dressing, the mode of distinguishing real from apparent death, &c. The *practical* includes exercises in loading and unloading sick-transport conveyances, stretchers, waggon's, &c., in marching with them, and handling them generally.

The period of training does not occupy above a month. In the following spring or summer, bearers trained during the winter are assembled with the Train for ten days' exercise. A sanitary detachment is formed, and marched out into the country, and various situations selected to represent the scene of a general engagement. A party of men is detailed to represent the wounded requiring carriage; these are sent on in front, and distributed in a lying-down position. To the coat of each a small label is attached, and on this label written the description of wound the man was supposed to have received. The sanitary detachment is then halted and waggon's reversed, stretchers and bandages, &c., got out, the bandaging-tent pitched, and the bearers advanced with their stretchers to the wounded, to dress them, and bring them in to the waggon's. At the bandaging-tent the injury is examined by the surgeon, and if nothing further is required, the wounded are placed in the ambulance-waggon's, ready for further

removal to the rear. These exercises are conducted by the garrison medical instructor. It is the opinion of an excellent judge of these matters "that the practical application of such exercises on a battle-field would contribute towards saving many lives that would otherwise be lost, but especially would be the means of preventing aggravation of fractures and other injuries, that would invariably suffer under like circumstances to such an extent as to render all attempts at conservative surgical practice unavailing, if no system of the kind were followed, nor corresponding aid available."¹

Returning to the *personnel*, to whom the safety of the lives of German wounded is intrusted in war-time, the second class comprises the hospital orderlies, or nursing staff. These men are employed solely in the hospitals, as ward attendants on the wounded; they form an essential part of the staff of all reserve hospitals, of the *etappen* hospitals along the line of communications, of all field hospitals, and to a less extent of the sanitary detachments, being, in the latter case, intended for duty at the various bandaging places. Bringing in the wounded from the battle-field on stretchers, &c., forms no part of their functions, nor are they ever employed on such duty; their special province is nursing: at the door of the bandaging tent their duties begin, and, generally speaking, those of the bearers end; while from this outset, until the wounded soldier's discharge from hospital—be it field, *etappen*, or reserve hospital, or death—the military nurse is called on to perform certain special duties, requiring no small amount of special knowledge, dexterity and skill, and the trustworthy execution of which is of such absolute necessity and vital importance to those most concerned. For example, at the bandaging places they assist the surgeons in dressing the slightly wounded, in applying such difficult bandages as plaster of Paris, dextrine, &c., in cases of fracture, in capital operations, and in attaching and making out "diagnosis labels"—in short, all subordinate duties are assigned to them by the surgeon. They have, besides, to assist in moving the wounded into the ambulance waggons for further distribution to the rear, in loading railway hospital trains, in packing and unpacking hospital equipment, and in pitching and striking the bandaging tents. Similarly in base hospitals, all the subordinate duties are assigned to them, so that they thus become very valuable aids to the Medical Department.

It must be manifest that, for the efficient discharge of these duties, very high class men are required—steady, intelligent, and trustworthy, and well versed in the special duties they will be called on to perform—if not, the wounded must proportionately in some ways suffer. As to whether hospital orderlies should be soldiers or civilians; to my mind, if forthcoming, no nurses should be employed on service other than military nurses; but, at the same time, the same necessity for a distinctly military body does not exist in this case as in the case of bearers; bearers are employed exclusively in the midst of active operations, whilst only a portion—a small portion—of the nursing

¹ Prof. Longmore.

staff is there employed, the remainder being distributed along the line of communications, where there is comparatively little danger to be encountered or risk to be run, and therefore not so much necessity for strict discipline. To be able to place dependence, however, upon that portion which is employed in the field hospitals and at the bandaging places demands a military organization; while civilians, with some distinctive dress, and with habits of obedience to the orders of superiors, and who had received the necessary training beforehand, might be employed in such situations as intermediate and base hospitals, and in railway hospital trains.

The course of training for the Prussian hospital orderly or military nurse embraces all these subjects, theoretical and practical, required by nurses in civil hospitals, to which, however, is superadded such knowledge of military medical subjects, with particular reference to field hospital equipment and sick-transport conveyances, as will fit them for the exigencies of campaigning.

No fixed period is laid down for the course of training of a Prussian hospital orderly, but as the range of subjects is wider, and the ward training requires time, it considerably exceeds the period required for training a bearer. To train a nurse in civil hospitals occupies from six months to one year and a half. I observe that the latter is the probationary period laid down in Miss Nightingale's recently proposed scheme for establishing a training school for district nurses in London. Probably from six months to a year would be the general average time required. But under no circumstances should the course occupy less than four months, which is the least time it is possible for even intelligent men to become thoroughly acquainted with their duties—a conclusion which I am warranted in drawing from the experience already gained by some hundreds of men who have passed through my hands at the Army Hospital Corps Training School. The necessity for keeping up a large reserve of orderlies in peace time will therefore be at once obvious—a necessity which, owing to the longer probationary period, is even more pressing than keeping up a strong reserve of bearers.

A word as to my professional brethren in the Prussian medical service.

The Prussian surgeon is taught to consider himself before all things a soldier, and his avocation as one to be practised under fire; and as a proof that such is the case, it is mentioned that no less a number than 80 Prussian surgeons fell in battle in the Franco-Prussian war of 1870-71. On first entering the Service, he is drilled on foot and in the riding school for a period of about six months, and this drilling goes on hand-in-hand with his military medical studies. At the termination of this probationary period, he thus not alone becomes disciplined himself, but has learnt the art of dealing with the disciplined—no small advantage in itself, a knowledge of the ways and wants of soldiers being absolutely necessary for him—and at the same time acquires that knowledge of his speciality by which alone subsequent success can be attained in the practice of military sanitation.

I am aware that there are those who would have us believe that civil

surgery and hygiène are one and the same thing as military surgery and hygiène, and that those who practise the former may, without further training, devote themselves to the latter. I for one, with all deference, however, hold a different opinion. Civil and military practice are the same so far only as their principles are concerned. The principles of both are the same, but the mode of application is modified. The civil surgeon, who has not studied military sanitation in all its branches, will find this to his cost, if he arrive for the first time at the seat of war, and is placed without an experienced adviser in a position of responsibility. He, without special training, can have no conception of the countless extemporaneous expedients that are to be employed for the relief of the wounded when the usual resources fail. His first experiments will possibly be a series of mistakes, which may or may not be irretrievable, while, if a thoughtful observer, the remainder of his time will be spent in improving or adding to the store of special knowledge, with a full complement of which he should have set out in the first instance. For example, take the one case of plaster of Paris splints, so much used in transporting wounded, and so little in civil life; although this might appear a simple apparatus to apply, I would strongly recommend those who are not adepts in its application, and who have not treated cases of fracture with it before, to make their first experiments on gun-shot fractures.

But although the Prussian surgeon is formed in this stern mould, which fits him to exercise powers of command over hospital subordinates (and in which he differs so materially from the surgeons of our own Service), and which powers have, since the war, been considerably added to, his position is not a satisfactory one on the field of battle. He is shorn of responsibility often when the interests of the wounded can ill afford him to lose it.

“ Every one will probably be willing to admit that the duty of clearing a field of battle is of vast importance, and that it may be accomplished with rapidity and methodically, the general direction should be under one head, responsible only to the General commanding for its efficient performance. It seems to be equally clear that the responsibility of this strictly professional duty should be borne by the principal medical officer of each division, adequate means being placed at his disposal for its proper execution. These means comprising sanitary detachments and field hospitals or other ambulance train, which should be commanded by its own officers, but at the same time with such regulations as will enable the responsible officer to direct the employment of the men and conveyances wherever and in whatever way they are most likely to serve the interests of the wounded.”

But in the Prussian Service this course does not obtain—the General, one would think burdened with quite enough work in directing the movements of his division, without requiring to work out details which might with propriety be entrusted to responsible subordinates—in this case the principal medical officer—takes the general direction out of the principal medical officer's hands, selects the sites for bandaging places and for field hospitals, and controls the move-

ments of the sanitary detachments, with what result can easily be surmised. Sometimes the sanitary detachments or field hospitals are moved to a part of the battle-field where their services are least required, thus throwing double work on the bearers; and sometimes the General, occupied with more pressing work, forgets all about the sanitary detachment, and leaves it standing idle, when it might be actively employed elsewhere. The remedy for this is easily supplied. Give the general direction of this professional duty to one officer, who has nothing else to think of, and hold him responsible for its execution; and I have no hesitation in saying that, if the right man be in the right place, the duty would be more efficiently done than under any other plan. This certainly is one point where the Germans have systematised to too great an extent.

On the other hand, in the American war of the rebellion, where another course was pursued, and where the commanders recognised and practised the principle of holding the chiefs of the medical department directly responsible for the execution of all field medical duties, investing them beforehand with the requisite authority, it is very remarkable how small was the mortality, much smaller than that recorded in any previous wars; and that the details were efficiently executed was made manifest by the unanimity which prevailed in the many favourable criticisms which appeared after the war, and since that time. As it bears on the subject in hand, I make no apology for quoting a short extract, showing the success of the system pursued, from Circular No. 6, of November, 1865, of the American official circulars. "Never before in the history of the world was so vast a system of hospitals brought into existence in so short a time. Never before were such establishments in time of war so little crowded or so liberally supplied. They differed, too, from the hospitals of other nations, in being under the command of medical officers. Instead of placing at the head of establishments intended for the treatment of disease and wounds, Officers of the line, who, whatever their other accomplishments, could not be expected to understand the requirements of medical science, and who, with the best intentions in the world, might seriously embarrass the action of the surgeon, as was sadly the case in the Crimean war, and as has since been the case in the English hospitals, our Government, with a wiser discretion, made the surgeon the commandant of the hospital, and thus, while holding him responsible for the results of its management, put into his power to do much to make those results favourable. The medical staff can point with pride to the consequence of this liberal course. Never before in the history of the world has the mortality in military hospitals been so small, and never have such establishments so completely escaped from diseases generated within their walls."

I fear I have dwelt on this well-devised and elaborate system of the Prussians—on its advantages and drawbacks—at a length which must have severely tested the patience of my hearers, but not at greater length than its importance demanded, for I believe it is a system which is not generally known, and that it forms the nearest approach to solving the difficulty of how to make adequate provision for assisting the

wounded in time of war in Europe. When we begin to compare the Prussian system with our own, we find that, in the British service, no distinction seems to be drawn between bearers and hospital orderlies—all hospital attendants are alike styled Army Hospital Corps men; and, in reality, our Army Hospital Corps men are trained to act in either capacity—either as bearers or nurses. Some therefore on service would act as bearers and some as orderlies or nurses. But, from what has been already stated, this is clearly a wrong principle to go on. A brief course of training in rudimentary subjects suffices to turn out a bearer.¹ To employ a man, therefore, in the capacity of bearer who has received the complex education required by an orderly is a mere waste of power—a course which may not inaptly be compared to cutting blocks with razors. The orderly's education fits him for a higher sphere, for the performance of a higher class of duties; and besides, being a much more costly individual to the State, from his prolonged probationary course than a bearer, he is more difficult to obtain, or replace, and in war time the extravagance becomes all the more apparent, in any Army like ours, which is recruited solely by voluntary enlistment.

Under the mobilization scheme which was published in the Army List for August, 1875, it appears that our active Army, which is intended for service in the event of invasion, or in a European campaign, is to comprise eight Army Corps. At the same time a fixed medical department was laid down for each Army Corps, the composition of which is shown below.² Amongst other items, it will be seen that 2,195 Army Hospital Corps men is the number required for an Army Corps on a war footing, 1,000 being stated as being for sanitary detachments, and therefore, I presume, to act as bearers, and the remainder to act as hospital orderlies. I believe I am correct in saying that the total existing strength of the Army Hospital Corps does not exceed 1,500 men; not sufficient, therefore, for supplying even one Army Corps. This being the case, it may not be devoid of interest to inquire by what means the present strength of the corps can be supplemented, so as to bring the total up to 16,000 men, the total number required at 2,000 men per Army Corps. A variety of suggestions have been advanced, from time to time, with a view to solving this particular difficulty. I propose now briefly to review the more prominent ones. It has been proposed to supplement the corps—

1. By increasing its existing strength to that required.

2. By employing bandsmen.

3. By employing untrained combatants from the ranks.

As to the first plan, viz., increasing the existing strength to that required, it certainly would meet the difficulty in one sense, but only by creating a more formidable one. In what manner could the excess (about 13,000 or 14,000 men) over and above the peace establish-

¹ *War Strength of Medical Department with an Army Corps.*

<i>Personnel.</i>	Medical officers	267	<i>Matériel.</i>	Ambulance waggons .	268
	Other officers	80		G. S. waggons	150
	Army Hospital Corps	2,195		Draught horses	418
	Drivers	568			

ment of military hospitals be employed in peace-time. There would be no field for their employment in hospitals, or in acting as bearers. The institution therefore would not be an economical one; besides, those who have entertained the plan have for the moment forgotten the mode in which the Army Hospital Corps is recruited. Its ranks are filled by volunteers from the ranks of the regular army. Government would not unnaturally be very unwilling to surrender so large a proportion of fighting men as 14,000 or 16,000 for non-combatant duty. In brief, I do not believe that any government would entertain the proposal for a moment.

Proposal No. 2, employing bandsmen, has very recently been revived in the columns of an influential medical journal, for whose views I have the highest respect, but with whom I must beg to differ on this point. If bandsmen are taken to supplement the Army Hospital Corps, "it must be remembered they have received no training either "to act in the capacity of bearer or nurse, and, even if trained, have "no organization which would insure the duty being performed." Besides, it is highly improbable that regimental officers would quietly submit to their bandsmen being taken away for periodical training, which would be necessary if this proposal were adopted, or for service with sanitary detachments, or for nurses in field hospitals—enlivening airs which would make the men step out and keep their spirits up, will be considered, and very justly, much more the province of the bandman on active service by the vast majority of officers. A sort of tradition, I am aware, exists in the army at large, that bandsmen are the men who may have to perform the duty of bearers in action, and they certainly appear to have been so employed in the Peninsular war, but I have been unable to find any regulation which directs their being so employed on service. But even if it be decided that they are to be so employed with a view to supplementing the Army Hospital Corps, it will be found that there is only a sufficient number of them partly to accomplish this end. If the twenty-one infantry regiments in an Army Corps supplied a quota of say 30 bandsmen each, this would give a total of 630 men per Army Corps, while a sum total of 2,000 and odd is required per Army Corps. This plan therefore is a notoriously inefficient proceeding.

As to the third proposal, should untrained combatants quit the ranks to perform the duty? This certainly has been, for the most part, the way in the British service in which it has hitherto been done, but it is open to several objections. The inevitable consequence must be an aggravation of the injuries of the wounded, and a prolongation of their sufferings; besides, a still graver objection arises from the prejudicial effect of such a plan upon discipline. But on this point I cannot do better than quote the words of Lord Strathnairn, when Commissioner at the French head-quarters in the Crimea: "Transport of the "wounded from the field of battle to a good ambulance, besides satisfying the rights of humanity and sustaining that spirit of confidence "in the soldier, which, like discipline, should never leave him, has "another admirable effect: it obviates the incalculable disadvantage "of troops engaged in action leaving their ranks for the purpose of

"carrying off the wounded. Certainly good soldiers have no other motive in leaving their ranks for this purpose than sympathy for a suffering comrade. But, on the other hand, all know that in a field of battle there are at times men of a different description, who either seek rest, or refreshment, or are as desirous of placing themselves as their comrades in a place of safety, and four or five such men are seen assisting a man for whom one attendant would be sufficient. Nothing is so likely to insure a reverse in action as the want of confidence and the gaps caused by men leaving their ranks to carry away the wounded, which is most practised when it is most prejudicial, at the time and places when and where the enemy has caused the most casualties, and, consequently, when every available man should be present and ready to fill up broken lines, and assist by his concurrence and example in resisting or attacking the enemy."

Each of these plans for supplementing the Army Hospital Corps proving impracticable or objectionable, there is but one approximate solution of the difficulty possible, viz., to draw on the auxiliary forces (the Volunteers) for the strictly military portion of the *personnel* required, and on the National Aid Society for the civil portion. This idea in its entirety has not originated with me, it has been advanced by Colonel Loyd-Lindsay, Professor Longmore, Major Burgess, and several veteran philanthropists; but so far as I know has never gone beyond the shape of a suggestion.

The regular forces contribute their quota to the Medical Department in the Army Hospital Corps, and as the Auxiliary forces now form a component part of the military system there surely can be no valid reason why they should not contribute theirs. Volunteers, from their general average intelligence being greater than that of Militiamen, would be a more suitable material to form bearers out of. I, therefore, name them. There are 1,747 companies of infantry Volunteers; if two men per company, strong, active, intelligent young men, of not less than two or three year's service as Volunteers, volunteered for this duty and underwent the necessary training for one month, at the end of that time the country would have 3,494 Volunteer bearers thoroughly qualified, and in every respect ready to take the field to act in that capacity. At the end of two months, if two more men per company were trained, twice this number of bearers (6,988), and at the end of three months, with six men trained per company, we should have 10,482 bearers—a supply more than sufficient to furnish bearers for our eight Army Corps, even if these were all mobilized at one and the same time. The only outlay required to obtain these 10,000, or even a larger number of bearers, would be that necessary to defray the expenses of a medical instructor (with a few Army Hospital Corps subordinates to assist), one of whom should be sent to the head-quarters of each Army Corps, with all conveyances and the apparatus necessary for him to commence the moment his classes were formed. Volunteer and other buildings would possibly be lent the Government for the exercises, &c.; while the men were being trained the exercises might then count as drills. On the quota of men for the station being trained, the instructor would be

directed to pack up his kit and move off to some other station, there to begin his classes and so on, moving from place to place until the entire number of Volunteer bearers for the Army Corps was trained. A proportion of Volunteer Officers and non-commissioned Officers should be trained at the same time, so that they would be ready to take command of the Volunteer sanitary detachments when these were formed on mobilization. To complete and perfect the training, all should be assembled for ten days' exercises in spring or summer, or oftener if found necessary.

A code of regulations for Volunteer bearers, defining their duties, and organization, and relation to the Army at large, would be all that would be required to make the movement a success.

This, of course, is assuming that the proposal were congenial to the temper and spirit of the Volunteer body. I, myself, believe it would. The Volunteer cannot hope to serve the cause of patriotism by evading any of the liabilities of his position, nor do I believe that he would be found unwilling to undergo any of the requirements physical or moral, which, in a state of invasion or general European war, might in this way, or in fact in any other way, be imposed on him.

Moreover, the employment of Volunteer bearers might not necessarily be confined to the seat of war. In peace-time such a body could give conclusive proofs of its utility at railway or factory accidents. A telegraph sent from the scene of a collision, for example, to the nearest "volunteer bearer" station, would bring a bearer party, with stretchers and dressings complete, by the next train, who would systematically set to work to dress the wounds and clear away the wounded in a pre-eminently satisfactory manner, such as unskilled labour could never hope to approach, or to attain to.

With regard to the 568 drivers required per Army Corps on mobilization to drive ambulance waggons, &c., these might in some similar manner be obtained from either Yeomanry or mounted Volunteer regiments.

Such is the plan by which I assume we could supplement the medical department of eight Army Corps, with the military increment required to act as bearers.

As for the increment, which may either be military or civilian, viz., surgeons and orderlies, or nurses, when we come to enquire how it can be provided, a problem of much greater difficulty is presented. A great part, however, of this difficulty may be removed by a pre-concerted arrangement with the National Aid Society. One function of this society might be to enroll, and where necessary, to teach, a staff of nurses and surgeons, who would enter into an engagement to serve either at home or abroad in the event of an European campaign, and who could be depended upon to fulfil their engagements; and as a test of the vitality of the engagement, they might from time to time be called on to serve with Army Corps on mobilization, or during epidemics, etc. But at the same time it should be distinctly given to be understood by these agents of the society that on their arrival at the seat of war, it was the intention of the society to hand them over to

the General for employment under the Chief of the Medical Department with the force in such situations at the base, or along the line of communication, as their services might be required at. I do not attempt to discuss details of how this could be done, for I am not aware of the resources at the command of the society; but of this I am convinced, that no more signal service could be rendered the nation than this very one to which I have been alluding. Material aid in time of war, it appears to me, is quite a secondary consideration for the society, it is not so much stores as men that are wanted: money can be made to purchase stores, but it takes time as well, to make orderlies and surgeons; and if the Franco-Prussian war be taken as an indication of the suddenness and rapidity with which wars in future will be commenced and conducted, there will not be time when once war has broken out, to organize the Medical Department for the force taking the field on its proper footing.

A reserve of some 1,000 surgeons and 8,000 orderlies or nurses is required for our eight Army Corps on mobilization, and I candidly confess I am unable to suggest any other mode by which these numbers could be obtained economically.

Although I so strongly advocate the formation of a reserve of orderlies and surgeons by the National Society, I would, moreover, suggest the inexpediency of small flying ambulances being sent, with roving commissions, to the seat of war by it. These may or may not be useful, and in the majority of instances, if the itinerary be closely examined, it will be found that the "marching" days are ten times as numerous as the "working" days. In short, I question their utility. They are likely to hinder the movements of troops, and to embarrass baggage masters and etappen commanders. I am aware that Mr. Manley's division of the Woolwich ambulance has frequently been pointed to as illustrative of the success of such small ambulances, but it must be borne in mind, in connection with this, that Mr. Manley, in addition to his other qualifications, was an Officer of great war experience, and his subordinates disciplined soldiers, so that his ambulance was essentially a military ambulance, which contributed far more to its success than either its independence or compactness.

The disorder in the administration of the volunteer ambulances of the French, which were purely civil institutions, is experience of great value, if it prevents a repetition of this kind of mistake on the part of National Societies. For instance, the chief of the 5th French ambulance writes:—"I might endeavour to show the improvements of various kinds of which the volunteer ambulance corps are susceptible. I shall, however, not go into details, as I believe that civil ambulances, so far as battle-fields are concerned, have played their rôle, and that rôle is finished." Again, the chief of the 6th ambulance writes:—"The sanitary service of the Army should have an organization wholly military, and in no way civil, upon the battle-field." The thirteen volunteer ambulances of the French National Society, having been found wholly incompetent, were disbanded in October, 1870.

[have time to mention only one other matter which might engage the

attention of the National Society, that is, the adaptation of railway waggons for the conveyance of wounded. Railways are of great value for removing wounded. The advantages offered by their use may be thus summarized :—they enable the active part of the force to be rapidly disencumbered of its wounded, and convey the ineffective soldiers to fixed hospitals, remote from the seat of war. A permanent halt can then be made in these situations, until recovery takes place. This expedites recovery, and sends men quicker back to the ranks for duty. Besides, railways assist in the dispersion of the wounded, and so diminish the risk of epidemics. And, lastly, they tend greatly to do away with the necessity for intermediate hospitals on the line of communications—institutions which are costly to maintain, and too often hiding-places for idleness, as was the case in the Peninsular war.

On British railroads there are three sorts of carriages which can be utilized for the purpose of transporting severely wounded, requiring the recumbent position :—

1. Goods waggons.
2. Second-class passenger carriages.
3. Specially constructed invalid carriages.

There is only one example of the class of invalid carriages in existence in England, as far as I am aware. It is employed, on the arrival of the Indian troop ships, in conveying invalids requiring the recumbent position, from Portsmouth to Netley. It is not probable that ever any large number of these will be constructed, but, even if they were, it does not follow that they could be got near enough the front to be made available; and, besides, such a reserve would be unnecessary, for goods waggons and second-class carriages can be easily adapted to take their place.

Sleeping-saloon carriages may be mentioned in the same category, and could or need not be counted on in time of invasion, for precisely similar reasons.

The compartments of second-class carriages can be prepared for the reception of two stretchers with severely wounded by placing two cross supports upon the opposite seats: the stretchers are then introduced into the compartments by the attendants, and laid on these.

The cross supports are made of wood, about 5 feet long, 6 inches broad, and $1\frac{1}{2}$ inch thick: a centre block and two side blocks are nailed on one side, leaving two gaps into which the side pole of each stretcher fits; the stretchers are thus kept from shifting during transit, and a space left between the two on which an attendant can sit.

But it is to goods waggons we must mainly depend for the conveyance of wounded requiring the recumbent position. Experience has demonstrated, that of the various conveyances, making up trains for the movement of large bodies of troops, 50 per cent. are goods waggons. These are the waggons, therefore, which will principally require to be adapted for the purposes of sick-transport; but as their springs are very stiff, means must be devised for lessening the roughness of the transportation. The simpler and more economical the method by which this is accomplished, the more suitable it will prove itself to be. Various methods have been practised from time to time. Sometimes the

floor of the goods waggons has been covered with a thick layer of loose straw or leaves, as was the case in the earlier part of the American war of the Rebellion, and the stretchers holding the wounded, then laid on this: but so imperfect was it found to be, that it was soon abandoned. On other occasions upright stanchions, provided with india-rubber rings, were inserted between the floor and the roof at the proper distance to receive the ends of the stretcher poles, and in this way two tiers of stretchers suspended in the waggon. Another comfortable plan, which, however, has been only submitted to experimental trial, consists in the employment of spring stretchers, which are made to contain within themselves the requisite amount of elasticity to obviate the inconveniences resulting from concussion or vibration.

These and other methods have been objected to on the ground of their cost or else complexity. "It must not be forgotten that a plan applicable to those waggons, which are most likely to be available near the battle field, viz., the goods waggons of the supply trains, is much preferable to even better yet more complicated arrangements."

The two simplest and best methods¹ of transforming goods waggons to hospital use are those of Mr. Grund and Dr. Zavodovsky—the former a Prussian, and the latter a Russian gentleman. Some short account of each may not prove uninteresting, and particularly of the latter, which seems not to be very generally known in this country.

In *Mr. Grund's plan* (*vide*, Figs. 1 and 2), three stretchers are supported on two transverse wooden bars resting on semi-elliptical springs. The springs are fastened at one end to the flooring to keep the bars stationary, while at the other end are rollers to permit the yielding of the springs. The latter are surmounted by clips to receive the cross bars. Two

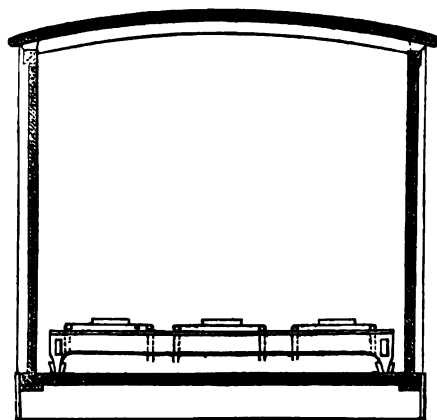


Fig. 1.—End section of part of a goods waggon, fitted on Grund's plan (after Loeffler).

¹ For an account of which I am indebted to a work on "Transport on Rail-Roads," by Assistant-Surgeon Otis, United States Army.

cross beams and four springs constitute the outfit requisite for the reception of three stretchers, and cost £1 16s. This system is simple, inexpensive, and comfortable, and of ready adaptation. Any sort of stretcher can be used. Four hospital railway trains, employed by the Bavarians in 1870-71, were fitted up on this principle. The trains made thirty-nine trips, transporting 10,800 patients.

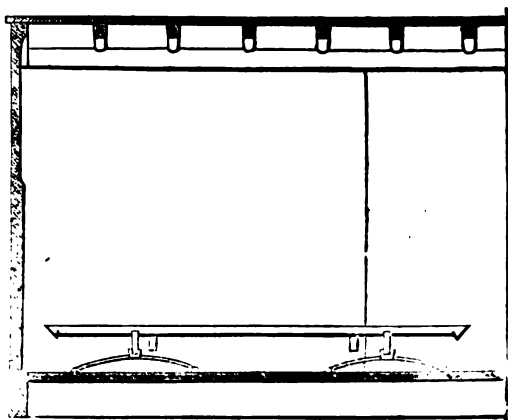


Fig. 2.—Longitudinal section of the same (after Loeffler).

In *Dr. Zavodovsky's plan* (*vide*, Fig. 3), two cables an inch thick are suspended across the top of the waggon, and secured to iron hooks that

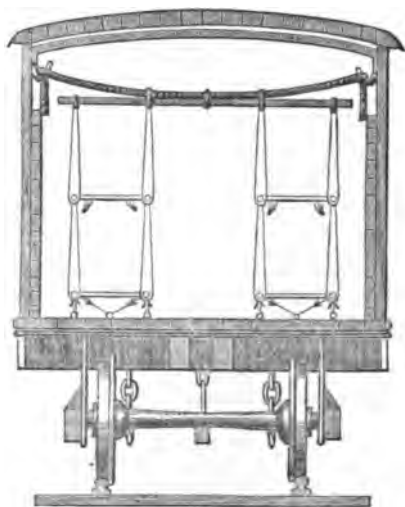


Fig. 3.—Transverse section of a goods waggon, fitted on *Zavodovsky's plan* (after *Zavodovsky*).

fasten to iron rings $2\frac{1}{2}$ inches below the roof of the waggon. If hooks and rings are not available, the ropes may be passed through holes bored in the side of the waggon. To each rope is attached a pole of oak, ash, or elm, at least 8 feet long, and $2\frac{1}{2}$ inches thick. To the poles are attached four cords with knots arranged that they may support the stretchers on a level. To prevent the swaying of the stretchers, the lower ones are fastened to hooks in the floor. Expense of outfit for four stretchers, £1 16s. The system is simple and inexpensive.

As Professor Esmarch remarks, "It would be a worthy undertaking for National Aid Societies to collect models of these and other plans, from which, on the outbreak of war, the requisite materials might be manufactured."

In conclusion, I have only to say that I hope the day may not be far distant when we can point to our ample hospital reserves—adequate in every way to meet the requirements of the wounded in an European campaign, and to tender my apologies for the many imperfections of what no doubt must have been to many a tedious lecture, and to thank you for the kind attention you have been pleased to grant me during its delivery.

Surgeon-Major MANLEY, V.C.: I can add very little, or absolutely nothing to what Mr. Moore has said; the lecture has been so exhaustive, and at the same time so much to the point. As far as my own experience goes, only one plan seems to offer, and that is the plan by which the wounded are distributed as soon as possible from the front; setting aside the military question altogether, on the score of humanity, it is the only one that can possibly be entertained. You save life in a great number of instances which otherwise would be sacrificed by leaving the wounded on the field, or by keeping them close to the front, you get them into better beds, they have better food, and you get them better treatment because you have more force and appliances available. I myself, after capital operations in the New Zealand War, such as amputation of the thigh, moved men four hours after the operation twenty-six miles in a country drag-cart with very good effect, much better than if they had remained in the tents in the front. As regards the attendance, our great failing is, I think, that the highly-trained Hospital Corps man is put to the duty of bearer, by which means his energy is exhausted, as it cannot be supposed that he can attend on the wounded men as well, because you must remember that these men require night and day attention; therefore a man very soon gets knocked up. I was looking over the mobilization scheme the other day, and I consider the number of Army Hospital Corps men quite inadequate. In fact, the field hospitals would be *hors de combat* altogether after three or four days' fighting, simply because the skilled orderlies are not supplemented by what I may call hospital labourers to do the rough work, or, in fact, bearers. I therefore think the Army Hospital Corps must be very much increased, and the only way in which it can be done is that suggested by Mr. Moore.

General CAVANAGH: It is in my power, from personal experience, to corroborate Dr. Manley's assertions as respects the practicability of at once removing the wounded to a distance. It has fallen to my lot to be twice removed, severely wounded from the field; and on the first occasion, when I had lost my leg, the medical man carried me with the regiment, because he was satisfied that under his own charge I should get proper attention, and I believe, owing to his adopting this course, my life was saved. I think we marched ten or twelve miles a-day for the three successive days after my leg was amputated.

Mr. FURLEY: I am afraid you do wrong in calling upon me, although I feel flattered that you should do so. I listened with very great attention to the admirable lecture that has just been given, but it would be an impertinence to tempt to add anything to what has been so ably said. I cannot pretend to enter

into such technical and professional questions. At the same time I must say the part I, as a volunteer, appreciate the most, and most perfectly understand, is, that suggestion made by Mr. Moore with regard to the manner in which the Army Hospital Corps should be recruited. That, I think, is an admirable suggestion, and certainly the most practical I have yet heard.

Mr. J. G. IRVINE: I do not know whether I may be in order in giving a little experience with regard to the possibility of Volunteers being able to carry out such a duty, but I think, as having been myself a Volunteer Captain, and as having also started a very perfect organisation of another character as firemen, I may say that I think the element that the author of this paper is falling back upon for his bearers is one that may relied upon. We have tested them as firemen, and find them quite equal to sailors.

Deputy-Commissary J. S. YOUNG: I feel some difficulty in rising, because just as a system is made up of details, so in this case—as the Chairman has said—the subject of the lecture is very wide, and it is therefore somewhat difficult to embrace all the subjects of criticism in a few words; but there are some points which seem to my mind worthy of one or two remarks. The lecturer has directed his attention chiefly to the mode of recruiting the Army Hospital Corps, and to the wants of the Army at large, as laid down in the mobilisation scheme. There is one thing to be said with reference to that, that the mobilisation scheme itself has not yet made its appearance except upon paper, and it may be presumed that the authorities have some scheme in their minds for developing the resources of the Medical Department equally with the resources of the combatant portions of the Army. At present there is but one Army Corps, which is stated to be completely filled up by the Line, and certainly the Army Hospital Corps, as laid down in that table, is not at present sufficient for the purpose. It must be remembered, however, that the strength of the Army Hospital Corps, specified in the table—namely 2,195, is a maximum strength for an Army Corps, at least I believe so; and that it is not exclusively for the conditions of home service but the maximum strength that may be applied to an Army Corps in any great European war; I take it, for most of the wars England has engaged upon, that such a strength would be altogether out of place. In connection with the suggestion for increasing the Medical Department by the aid of Volunteers, I would just point out this one fact, that it looks very much like continuing the regimental hospital system. It is making a unit within the regiment itself, a system which the Secretary of State for War only last session, in introducing the Army Estimates, laid down that he had departed from entirely, and he stated that he would not listen to any plan which involved the introduction of the regimental hospital system. I am afraid, therefore, that this suggestion is quite at variance with the principle laid down broadly by our War Department. At the same time it seems to me branching out from this suggestion; it is quite possible, in connection with local volunteer bodies, to organise a sort of Reserve Army Hospital Corps, which shall not form part of the combatant volunteer force in itself, and by localising its efforts to spread it throughout the country in such a way that its members can make use of all the local means which are peculiarly known to themselves as being in the locality in which they serve. I think in that respect certainly an addition might be made to the resources of the Medical Department. There was one other point, and that is, the suggestion that the National Aid Society should furnish, or rather that we should like the National Aid Society to furnish, surgeons to aid the regular service. It seems to me that that is placing the National Aid Society in a position it may not feel itself able to come up to, because it assumes that the society is placed upon some recognised and definable official basis, whereas at present it has only existed as the outcome of national sympathy with the sufferings of the sick and wounded during the Franco-German war. If any efforts were made in that direction it might tend to lessen the responsibility of the Government itself to give that complete and perfect system which it ought to establish within the Army itself. In that way I think it might be dangerous to rely upon the National Aid Society, though at the same time I feel that just as there was a field during the Franco-German war for aid to the sick and wounded, so there will be again in any great war that may subsequently arise.

Sir WILLIAM CODRINGTON: The point I wish to remark upon is the value of

the lecture with regard to establishing a certain number of men either in rear of each company, or in rear of each battalion, specially adapted for the purpose of taking the wounded off the field; this I should imagine was the general tendency of the lecture. Any person who brings that to the notice of the Government, in order to establish that which every military man must feel to be a necessity, would give a great advantage to the army in which it were adopted. The tendency to help a comrade is laudable; but when it perhaps employs four men to take one man to the rear, you may imagine what a diminution it may cause to the fighting force in front. The only way of really preventing that, is to have men told off, as in the German services both of Austria and Prussia, men whose special duty it is. In that case, when any other person leaves the ranks, it becomes a breach of duty, because we know that there are other people able to take that man off the field, and do it better than the man with arms in his hands. I think that is the main point we should wish to see established in the Army, and I hope the tendency of this lecture will be to put it in that light. In that respect I, as a combatant Officer, should feel it is of the greatest possible advantage. The details of the medical part, namely, moving the wounded quickly off from the front to the more immediate rear, and then eventually to their own homes are, no one can doubt, of extreme value.

The CHAIRMAN: It remains to me to tender our thanks to Mr. Moore for the very interesting lecture that he has given us, on a subject of the very deepest importance, and one which must enlist the sympathies of all Englishmen and Englishwomen. We know that war is a great and tremendous evil, but nevertheless we all admit that it is a necessary one; and, if we are bound to admit that it is a necessary evil, surely it is the part of all humane people to be quite certain that they have done all in their power to render aid to the soldiers who are bound under their sense of duty and under their engagements to go into war; and it is nothing else than our duty to see that everything is done within our power for affording them that assistance which they may unfortunately require. Having listened attentively to the interesting lecture, I am bound to say, speaking in the presence of Sir William Codrington, that I am very glad Mr. Moore has drawn our attention to the fact that we are behind some other nations in providing for the clearance of the wounded from the field in time of battle. Sir William Codrington's remarks are not new to me, for shortly after the termination of the French and German war, I gave a lecture in this theatre, and Sir William Codrington at that time drew attention to the necessity of having a staff of men trained to carry the wounded from the field. I remember his drawing attention to the fact, that it was a very great risk to allow our soldiers, men who ought to be using their rifles, and engaged in military operations, to leave those duties in order to carry the wounded from the field. After so long a period as has elapsed since the French and German war, I do think it is to be regretted that our lecturer found it necessary to go the Prussians to teach us what should be done. We should have been much better pleased if Mr. Moore had been able to tell us what we had done ourselves, and what we might learn from preparations already completed for the transport of the sick and wounded in war. Unless these things are practised in time of peace it needs no proof to show that when we are put face to face with an enemy there will be great difficulty in carrying them out. It is like drill, we cannot expect soldiers to be acquainted with it unless they have practised it in time of peace; neither can we expect those who should carry the wounded off the field to the field hospitals in the first instance, and then to the more permanent hospitals in rear, unless they have been taught the manner in which it should be done, as described in the lecture. With the Prussians the system may be said to be simplified by great consideration and management, and it has become comparatively a simple thing. But first, the organisation must be there; and I should like to ask whether we now have a thoroughly well thought-out scheme by which when we go to war, this most important duty will be efficiently performed. Our sympathies are all with it,—the sympathies of the Queen, the sympathies of the Royal Family, and the sympathies of all the people are in favour of a good service for the sick and wounded; but, after all, what has been done? I am afraid that very inadequate provision has been made to meet this want. Mr. Moore has suggested, that we, as a National Sick and

and Wounded Aid Society, should lend our assistance, or at all events offer our assistance, and if possible give our aid as volunteers to supplement this want, which is admitted to exist. I believe that we should be able, and if asked, we should be willing to do something. But you must remember, that we are unrecognised. We have never received any encouragement from the Government, and we have never, in any way, been recognised by the military authorities; and I am convinced at this moment that if we were to make such an offer as that which has been suggested, we should be told that it was perfectly unnecessary, and that the whole thing was properly arranged. I will not say anything more upon this subject. It would not perhaps be becoming that we should discuss that question in this room. I will merely add that the discussion has been most interesting; and on your part, I beg to tender to Mr. Moore our very sincere thanks for his lecture.

Ebening Meeting.

NAMES OF MEMBERS who joined the Institution between the 30th May and 19th June, 1876.

LIFE.

Spratt, A. G., Lieut. 1st West India Regiment.

ANNUAL.

Lloyd, G. M., Lieut. R.A.

Graham, F. W., Captain 103rd Regt.

Harrison, Henry, Lieut. late 8th Hussars
Boys, Charles Vincent, Lieut. late 7th
Surrey Rifle Volunteers.

Monday, June 19th, 1876.

ADMIRAL SIR HENRY J. CODRINGTON, K.C.B., in the Chair.

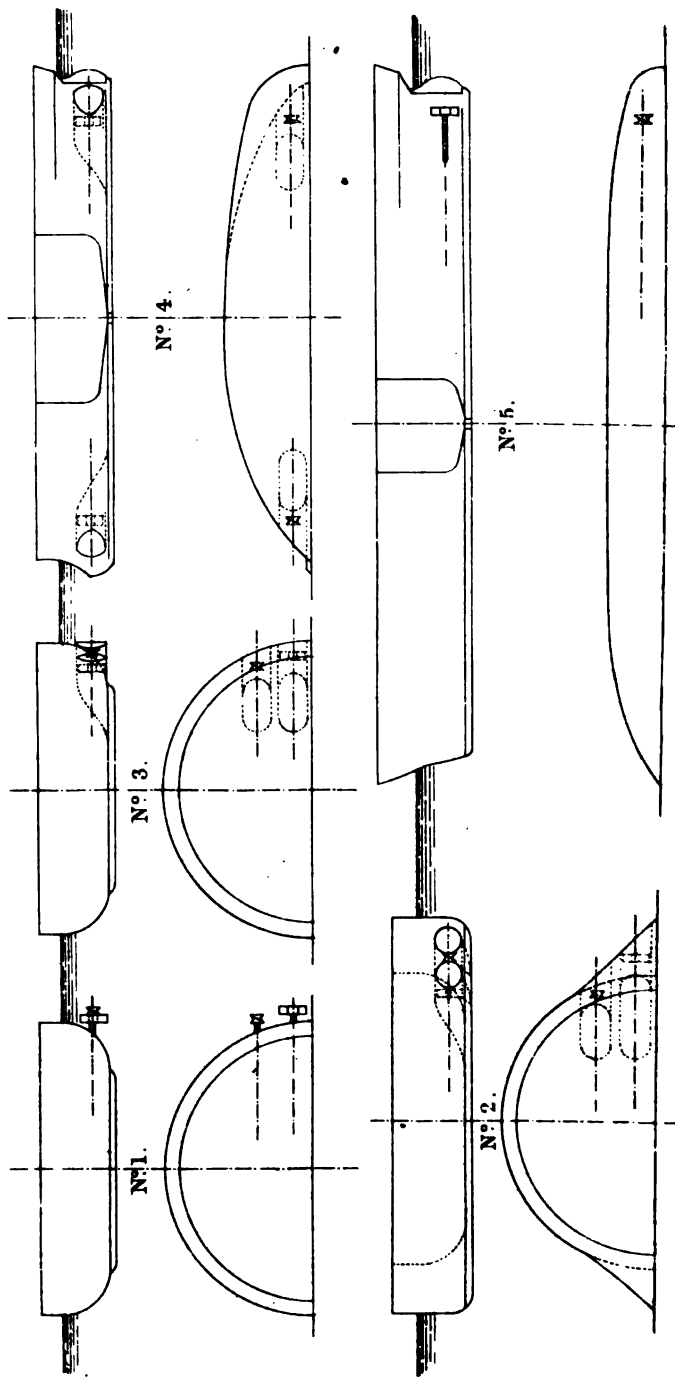
**ON THE BEST METHOD OF PROPELLING STEAM SHIPS,
SO AS TO GIVE THE GREATEST FACILITY FOR MAN-
ŒUVRING IN ACTION, AND FOR AVOIDING COLLISIONS
AT SEA.**

By R. GRIFFITHS, Esq., C.E.

SINCE I proposed reading a paper on the above subject, I have been making several experiments with models, and it may not be out of place here to explain those results which are connected with the present subject.

Since the introduction of steam for propelling ships, there have been proposed numerous plans and suggestions for obtaining the greatest speed with the steam power employed, the principle movement being in the direction of lengthening the ships relative to their width; this plan has been carried so far, that screw ships are now constructed whose length is from eight to twelve times their beam; while armour-plated ships have been carried to the other extreme, and have been constructed with a length only equal to their width. With regard to the lines of a ship, there appears to be as great a diversity of opinions as with regard to its proportions; and there are advocates for full bows and sterns, fine bows and sterns, wave lines, and lately, I find, for stream lines; but it appears extraordinary that, after all the elaborate experiments that we constantly hear of being made, with such extraordinary results, there does not appear to be any improvement in the speed of ships-of-war, relative to the power exerted to propel them, over that which was obtained twenty or thirty years back. Nor has there been any improvement, as far as speed is concerned, in the screw-propeller; the only improvement has been made by the engineer, who has constructed engines which, with the same consumption of fuel, give out considerably more power than was formerly obtained.





Scale $\frac{3}{4}$ Inch - 1 Foot

The great question that now requires to be solved is, how to make war-ships capable of meeting all the exigencies of the present age? It will be admitted that, whatever may be the destructive weapons used in naval warfare, speed and facility of manœuvring will be essential elements in the ship's favour. Of the two, I consider speed and safety to the ship of the greatest importance, and, to obtain it, ships must be made from four to six times their beam in length. The movement at present appears to be in favour of *shortening* ships of war: this offers several advantages, such as reducing the armour relative to the displacement, and enabling the ship to manœuvre better; but I find that when the length is reduced to three and a-half to four times the beam, the resistance, relative to the displacement, begins to increase. The diagrams, Nos. 4 and 5, represent models of the same displacement, the weight of each, with the propelling apparatus, being 44 lbs. No. 5 is eight times its beam in length, viz., 5 feet long, $7\frac{1}{2}$ inches beam, and is fitted with twin screws in the ordinary manner. No. 4 is two and three-quarter times its beam in length, viz., 3 feet $2\frac{1}{2}$ inches long, 1 foot 2 inches beam, and is fitted with screws in tunnels. When the models were towed through the water at the same speed as when propelled by screws, the resistance of the short model was to that of the long as five to three; but when they were propelled by the same power and screws, both made the same speed, viz., 88 feet in a minute. This was caused by the screws in the tunnels of the short model drawing their supply of water from underneath the model at sufficient distance forward to prevent them retarding the model by drawing it from the stern; but when the screws were moved back $3\frac{1}{2}$ inches out of the tunnels into the open water, and the tunnels plugged up, the speed was reduced to 62 feet in a minute, and the resistance to the power was increased. For, when the screws were in the tunnels, the revolutions were 645 in the minute, and 565 when the screws were moved into the open water, though the strength of the springs and the pitch of the screws were exactly the same in each case; and in all my experiments I find that, when the screw cannot, or does not, obtain a sufficient supply of water, it requires more power to obtain the same number of revolutions, and less speed is given to the model relative to their number.

The armoured ships of the present time are generally fitted with twin screws, with separate engines to each screw, both engines being together, and subject to be disabled together, in case of the ship being rammed, or a torpedo striking it. My opinion is, that ships of war should have their engine-power and screw-propellers separated into four distinct compartments, so that, should the ship be injured by ramming or by a torpedo, only one-fourth of her engine-power might be disabled; this method would also give increased facility for manœuvring. When twin-screws were first introduced, it was expected that, by reversing one screw, a ship might be turned round on its centre, and would also answer her helm quicker than if fitted with a single screw; but practice has shown that twin-screws possess no advantage over a single screw for steering or turning a ship. Now all the anticipated advantages of twin screws can be more than fully

realized by having two screws within tunnels at each end of the ship; for, by going ahead with the port engine and astern with the starboard engine at one end, and ahead with the starboard and astern with the port engine at the other, the vessel would turn on her centre in a very short time, and would answer her helm when going either ahead or astern much quicker than is now the case. Moreover, when the screws are employed in tunnels, they can be so arranged that they may draw their supply of water from *inside* the ship in the event of a large breach being made by a ram or a torpedo, and thus the whole power of the engines could be made available to pump out the water while the vessel would also be propelled.

With regard to the speed obtained by the models, when the difference of resistance is taken into account, it will be found that nearly 16 per cent. more speed is obtained by working the screws *in tunnels*; and there can be no doubt but that this amount is lost in all vessels which have their screws worked in open water.

In order to avoid collisions at sea, which have of late caused so frightful a loss of life and property, it becomes imperative on steam ship owners to adopt every practical plan that would have the effect of reducing the risk of their occurrence. The most necessary requirement is to have the ship constructed so that she will answer her helm quickly under all circumstances, and I feel convinced that commanders of steam ships are often unjustly blamed by the public when they have met with a collision, for when a steam ship gets so near to another as to render a collision probable, the first thing that is done is to stop and reverse the engines. The helm has then no control on the ship, while the momentum carries the ship forward for a considerable distance. In many cases she would be more likely to escape the collision if the engines had not been reversed, for then the helm might have been sufficient to turn the ship so as to escape it; but should this have been done, and a collision take place, what would a jury and the public say? All passenger steam ships ought to have their engine-power divided between the bow and stern, which would give considerably greater safety, as well as speed and other advantages. With such an arrangement, a commander would have perfect control over his ship, for by stopping the bow-engine and reversing it, and allowing the stern-engine to remain working, the ship would be brought to a stand-still quickly, while her helm would continue to act until she was entirely stopped. I have no doubt that at some future time the Legislature will compel passenger ships to divide their engine power, and not allow so many lives to depend on one engine and on one propeller,

I will now briefly describe the models and give some of the results obtained by my experiments.

Diagram No. 1 represents a model similar to the Russian circular ironclad "Novgorod," which when tried gave a speed of 52 feet in a minute with 640 revolutions of the screws.

Diagram No. 2 represents the same model, but it is fitted with elongated ends, and the screws are placed in tunnels. When tried it went 68 feet in a minute with 645 revolutions.

Diagram No. 3 represents the same model, but without the elongated

ends, the screws being still in tunnels. This went 66 feet with 645 revolutions.

Diagram No. 4 represents the model $2\frac{3}{4}$ times her beam in length, which is fitted with screws in tunnels. When tried it went 88 feet with 640 revolutions.

Diagram No. 5 represents the model of an ordinary ship 8 times her beam in length, fitted with twin screws in the ordinary manner, which went 88 feet with 620 revolutions.

In these experiments, the power employed and the displacement of the models were the same in every case. The experiment in towing models Nos. 4 and 5 to show their relative resistances, before referred to, was accomplished as follows: the models were attached to each end of a rod 6 feet long, and a line was attached to the rod between them. The point of attachment of this line was then shifted till the rod would remain at right angles to it when the models were towed at the speed they would make by their screws, viz., 88 feet a minute, and then the distances from the ends of the rod to the point where the line was attached showed the relative resistances of the models. These distances were found to be 2 feet 3 inches from the short model and 3 feet 9 inches from the long, so that the resistance of the short model was to that of the long as 5 is to 3. In another experiment the short model was propelled by her screws moved back out of the tunnels into the open water, and the tunnels left open, and the speed was then found to be only 71 feet in a minute with 600 revolutions; and when the tunnels were plugged or stopped, the screws being left in the same position, the speed was reduced to 46 feet in a minute with 558 revolutions.

In conclusion, I would remark there is one feature in connection with having the screw-propellers worked in casings or tunnels to which I drew attention here some time back, and to which I would again refer, viz., as to the facility it offers for drawing the water out of the ship, should she be rammed or be struck by a torpedo. An armour-plated ship, with 800 to 1,000 nominal horse-power, would require four screws of 12 to 15 feet diameter, and, when worked at full speed, would discharge a column of water through each of them at the same speed as the ship would make. It follows, therefore, if the engines gave out the power that would propel the ship at 10 knots. each screw would discharge the water inside her at the rate of about 3,000 tons of water per minute, provided suitable arrangements were made; and since the probability is that a ship in action is more likely to be disabled by a ram than by a shot, or by a torpedo, I think this point should be well considered by those who have the designing of our ships-of-war. I agree with Captain Scott, in the very able paper he read here last Friday, in which he gives the first place to the ram, and the next to the unsinkability of ships-of-war, and I consider that we shall very soon find that the guns will become of secondary consideration to the qualities of high speed and unsinkability in ships. From some recent experiments which I have made (which, for several reasons, I cannot at present disclose, though I may state this much), I foresee that greater speed, invulnerability, and unsinkability may be effected by very simple modi-

fications in the construction of our ironclads, and which results are quite within the power of the authorities to effect without that enormous outlay which the armour-clad ships of the ordinary types would require for effecting these objects.

The CHAIRMAN: I hope some gentlemen present will favour us with their remarks on the lecturer's paper. I would myself begin by asking a little more information on one or two points. I do not quite understand whether those tunnels are to be opened below, so as to allow the water to flow into them from below. (Mr. GRIFFITHS: Exactly so.) But supposing we leave them open below, so as to allow a free volume of water to rise up underneath and flow into them, how is the proposed connection made with the cavity of the ship, in order to extract the water which has leaked into it? How is that communication to be made so that that water which rises from below into the tunnel will not by preference go also into the cavity of the ship, as well as supply the screws? How is the engineer to shut off the external water rising up from the bottom, and to take the water from the cavity of the ship? Then we must remember that by putting four engines into a ship; two at each end, we come across other difficulties. First of all, there is the difficulty of the chance of collisions, which mostly affect the fore-body of the ship. There will also be a very large gap taken out of the strength of the ship in the fore-body, in addition to what is naturally taken out of the run of the ship. We must provide some means of strength for that fore-body, or something to make up for that. Then there is the difficulty of having four engines to deal with, instead of merely at most two: there is the supply of fuel and all the requirements of the engines, the additional space required, which would take out of the space for cargo or for anything else, and of course the additional hands required in the engineer's department, to attend to four engines instead of two. I presume in the trial of the towing, the screws were not fixed; in each case there were two screws, and in each case those two screws were allowed to be free.

Mr. BURGESS: Mr. Chairman and Gentlemen,—I should like to offer a remark or two. Mr. Griffiths has been good enough to give us a great deal of information on the screw, but there are one or two details he has entirely left out. He has not told us what time his vessel will back in, and whether there is any difference when he applies the tunnel in combination with the screw; that is to say, supposing he is going at a certain speed, and stops the engine and reverses, I should like if he would give us what time it takes before the vessel stops, then what time it takes before she goes astern, and also whether there is any visible difference when the tunnel is left out?

Captain Sir GEORGE BIDDLECOMBE, R.N., C.B.: I should like to make one remark with regard to enclosing the screw with a tunnel. We have already in the Navy fitted one vessel of that sort. Mr. Turner, assistant master shipwright at Keyham Yard, in 1858, fitted one (as stated in a lecture given by me here), and from various experiments he had previously made, he concluded that it would be very successful. The Government gave him the opportunity, but I am sorry to say the speed obtained by the screw being enclosed did not come up to what she originally worked at when it was open. I merely mention this as a fact. In regard to introducing a screw into the fore-body of a ship, especially of a man-of-war constructed as a ram, I do not know how that would act when you are going to ram a ship. For instance, in coming into collision with her, the chances are your screw would be in a very awkward position, and possibly get much injured by the collision, and you may not then be able to work the screw again. There is another point the lecturer mentioned in reference to collisions, that it was objectionable to stop and reverse the engines. My experience does not lead me to concur in that opinion; but I think if we saw a collision about to take place, common sense would dictate that we should stop the engines at once, because with the speed the ship had upon her, the helm would still be acting. I do not agree with the view that the ship is not acted upon by the rudder after the screw ceases operation.

Admiral SELWYN: I have one or two remarks to make on this subject, because I have taken a considerable degree of interest in Mr. Griffiths' experiments, as show-

ing the anxiety of a steady worker to prove by models all that could be so arrived at, and he has done a great deal in this direction. I also take a great interest in developing the screw off the face of the earth. I want to see its place taken by the turbine, and Mr. Griffiths has made a step towards making it a turbine by casing it. I doubt very much indeed that a division of the power, and therefore of the engineers and stokers, would be an advisable thing, either on board a man-of-war in action, or in a merchant ship, with a view to economy. You cannot work a number of stokers at two sets of furnaces in different parts of the ship with equal effect to that obtainable with the same number at a single set of furnaces. You must have different engineers, therefore you must engage inevitably in more expense. You must have two engineers in each watch, and a certain number of stokers to each set of fires. Each man cannot do his best work if he has not his full number of furnaces to attend to, and if he is obliged to go to another part of the ship. I should say you must have your staff nearly doubled. It is a question of economy. Whether it may be more advisable in the view of propulsion to put them there, is another thing; but at least in our mercantile marine, economy carries the day in every shape and form. Mr. Griffiths' experiments show very strongly the enormous value of a constant reference to a still larger series of experiments, of which very few people avail themselves to their full extent. I speak of Colonel Beaufoy's. Colonel Beaufoy has shown in a very large and long series of experiments, nearly all the facts that we now are trying to bring out. These would be more generally referred to if only they had been put in a condensed form; but it takes a man half a lifetime to get out the value of Colonel Beaufoy's experiments. He has shown one remarkable thing, and that is this: that whether you divide the water by a very narrow fine bow, cleaving the fluid like an axe, or whether you put that narrow fine bow flat on the water, and drive it over the water, the resistance is for all practical purposes the same: having fine lines, there is no more resistance in the one case than in the other. I say this because Mr. Elder distinctly showed by an experiment precisely similar to that of Mr. Griffiths, that is to say, a species of steelyard arrangement at the stern of the ship, and towing large models from it, that whether he took the finest vessel of deep draught and ten beams to the length, or whether he took a vessel of similar tonnage, but made of the shape of the segment of a sphere, there was not the slightest difference between their resistance. But there was this remarkable difference in another way: that whereas the sharp deep-keeled vessel plunged under water constantly and made bad weather of it, the segment of the sphere always rode over the water with perfect ease. I must demur to Mr. Griffiths' ideas about the turning by twin screws. I went down with all Mr. Dudgeon's early twin screws, and was witness to their turning with the utmost facility in smooth water. I am not so sure that they would always turn well in a heavy sea, and I have heard that they do not do so. But it is a great thing to be able to turn in a ship's own length, even in smooth water. When we attack in harbours or in smooth water, we shall very often find it of very great value, and as we shall not generally fight fleet-actions in gales of wind, it may be extremely useful in that case at sea also. Twin-screw ships do turn on their own centres so quickly that the remark of Sir Edward Belcher, who was with me on that occasion, was that he could not train the gun on board the ship so quickly as he could turn the vessel; that it brought the gun up to its mark better in every respect for the gunners than if he had tried to twist the gun about with screws and levers. Still, all these experiments have their value; and although I quite agree that for a man-of-war a screw at the bow is a very questionable advantage, I should much rather have something inside the ship altogether, if I could do it. When we come to substitute the use of the ram for guns and shot, I quite agree with the lecturer that the ram is a shot of the number of thousand tons force which is due to the mass propelled and its velocity, and therefore it is an irresistible shot. Admiral Sartorius's views on that subject are too well known in this Institution for me to advert to them. He was one of the first advocates of it, and he has been proved to be perfectly right in all that he advanced. But if we are to have a ram it is impossible to have the screw in the bow. It would simply be throwing away half the whole engine-power to do so. We could not hope to have the bearings in their proper place after the shock of ramming, and we all know what a distorted bearing of a screw-shaft is. Therefore I do not think we shall make any great progress in that direction. In the

experiment Mr. Griffiths has also tried an enlargement (first proposed in this theatre by Mr. Reed) of the Russian circular ships, giving her the bow and stern which Mr. Reed advocated, that is to say, a species of compromise between the sharpness of the deep-keeled ship, keeping the wedge shape to cleave the water, and the extreme diameter of the Popoffka and her sisters, I see one of those compromises which seldom gives full value in any direction, and Mr. Griffiths has thoroughly well proved that it does not give value in the sense of superior speed to any very great extent. On the other hand, taking the circular ship for what she is worth as an unmasted steam-driven vessel of enormous capacity and tonnage, capable of carrying coals for any voyage at any speed, with any gun and any weight of armour, I do think that there is a great advance to be made, and I hope to see strong attention given to the subject, as I also hope to see new experiments made on the "Waterwitch," to give us some idea of the value of the turbine-propeller.

MR. GRIFFITHS in reply said: The first question is whether the screw takes the water from below. It certainly does, as shown in all these drawings; it comes from below right into the screw and passes out at the stern, and at the bow enters in front and passes out underneath the ship. With regard to the strength of the bow, I contend that the strength of that bow is as great with these screws as you can make it on the ordinary plan. Now, if I make a beam through the ship like a backbone, and make the tunnels and put the screws as far back as you like in the ship, the tunnels being built in the ship, how can anything give way? or that backbone can be made as far back as you like into the ship; so far as that goes, it is equally as strong as if there was no screw at all in the bow. The great advantage of taking the water from below is, as has been explained several times,—Mr. Froude experimented upon that,—that if you put the stern screw outside, it sucks away from the ship that water which would go to fill the space the ship has left, and, consequently, there is just double the resistance to the ship when the screw is pulling the water back. That he has proved and explained in two or three papers, and I find that to be the case in my experiment. It is not only what it takes from the ship, but this water that is forced back stops the current which runs after the ship to fill the space, so that it has a double effect in stopping the ship.

With regard to sucking the water out of the ship, one way which I have tried, and which I believe to be the simplest plan, is to have outside this tunnel (*pointing*), about half way around it, a space left all along connected with a pipe inside the ship. The forcing of the water through that tunnel will suck the water out of the ship. There was an experiment to this effect shown the other evening at the Royal Institution by Mr. Froude. The first who brought that out was Bernoulli, who showed that if water was flowing through a horizontal pipe at 9 feet per second, and a vertical pipe was connected with the horizontal one, water would be drawn up the vertical pipe a height of 2 feet in opposition to gravity. Mr. Napier, of Glasgow, has proved that by putting a pipe through the bottom of a ship, the suction of the water down, would show the speed of the ship. This takes place here exactly, when the screw is working, the water is forced back at half as fast again as the speed the ship is making, or faster according to the power exerted; first it takes the speed of the ship and afterwards the speed the screw forces the water back. If you are sucking the water from the inside at that speed, you may depend the water will go pretty quickly out of her.¹

ADMIRAL SELWYN: Is the access of the water cut off at the time you use the inductive, or the eductive, effort of the screw to pump the water out of the ship?

MR. GRIFFITHS: No, certainly; not. The screw uses the water from the sea, but the force of the water that it sucks through the tunnel also sucks the water

¹ I find from some recent experiments which I have made, that this plan cannot be relied upon, for the least leakage of air into the conducting-tube will destroy the effect of it, and an arrangement to shut off the sea-water from the screw and open the communication from inside of the ship to the screw would be preferable, or a rotary or other pump could be easily worked from the screw-shaft when required and the discharged water could be used for manœuvring the ship if required.

out of the ship. Nothing is wanted but a valve to stop the pipe that is connected with the water within the ship.

A VISITOR : When the vessel is proceeding forwards, does the water go back, because if the water goes back then it is all slip, the ship would not move. Water never does run back when the ship is going forward.

Mr. GRIFFITHS : Of course when the screw is working the ship moves on ; if the ship is kept standing still, the water will be forced back. Loose the ship and nearly double the water goes through the screw directly.

The VISITOR : Not driven back.

Mr. GRIFFITHS : The ship goes forward. You must take the speed the ship goes, as well as the quantity of water the screw draws. I think in one of the papers I read, I explained that the pressure is double when the ship is under way.

With regard to the boilers, all the boilers would be placed in the centre of the ship whether working the forward or aft engine, and, consequently, that removes the difficulty with regard to the stokers. There need not be two sets of stokers if you divide the power, any more than if the whole boilers were working on one engine. Then as to how soon she will go astern : I found that by reversing the forward engine she would stop in one-third the time that she would if I reversed the after engine, because she drives that water forward against her, which is not the case with the engine at the stern ; as to the speed, it is no matter at all which way I go, forward or backward, it makes no difference in speed or anything else. With tunnels around the screw there is a loss of speed, but how nobody ever ascertained the cause of it, is strange. I was with Ericson trying that experiment forty years ago, and he found directly there was loss of speed. When a screw is working in open water it gets a great quantity of water all round the periphery to supply it, whereas if you put it in an ordinary casing you stop the supply and your screw is short of water, but if you continue your casing and put a bell-mouth equal to the quantity of water the screw requires, you make up for that loss,—it is the funnel-mouth that makes the difference. In these casings I have a funnel-mouth which gives me about 50 per cent. more water than the area of the tunnel gives me. I enlarge the mouth of the tunnels according to the power used on the screw, and the effect of the screw in propelling the ship is in proportion to the water it gets supplied with.

The CHAIRMAN : However we may criticise some details of this plan, I think we must all feel obliged to Mr. Griffiths for the information he has given us on this point. There is a great deal that I admire in it and a great deal in which I go cordially with him, though in one or two points I might criticise him. I think we must all thank him very much for his lecture.

SPECIAL LECTURE.

Friday, December 15th, 1876.

GENERAL SIR RICHARD DACRES, G.C.B., R.A., in the Chair.

"A SKETCH OF THE RUSSO-TURKISH CAMPAIGNS OF 1828-29 IN EUROPE AND IN ASIA."

By Lieutenant-General Sir RICHARD WILBRAHAM, K.C.B., &c., &c., &c.

I HAVE found it a more difficult task than I had anticipated to bring so large a subject as the Russo-Turkish war of 1828 and 1829 within the compass of a single lecture.

My lecture professes, indeed, to be merely a sketch, but I fear that in some parts it will be little more than a bare outline.

It has been my endeavour, at all events, to bring before you in a clear and connected form the most important operations of a war, which is of peculiar interest at the present moment. I need scarcely say that I have treated the subject exclusively from a military point of view.

The chief interest and value of a study of the war of 1828-29 lies in this:—that it is the most recent of the many wars that Turkey has waged single-handed against her powerful neighbour. It therefore gives us the most reliable data that we can command for forming an estimate of the comparative military strength of the two powers.

We must, of course, bear in mind, in making such comparisons, that Russia was carrying on an offensive war at a great distance from her resources, while Turkey was acting on the defensive within her own borders.

War between Russia and Turkey was already imminent at the close of the year 1827, and indeed it had been evident long before that time that it was inevitable.

The Russian Army collected during the early part of 1828 on her southern frontier consisted of three corps, the 3rd, the 6th, and the 7th, and was placed under the command of Field-Marshal Count Wittgenstein, a name well known in the Russian wars against Napoleon. Later in the year it was augmented by another corps, the 2nd, and a division of the Imperial Guard. Moltke estimates the effective strength of the whole force employed against Turkey in the

MAP OF THE
RUSSO - TURKISH
TURKEY IN 1
IN
1828. 1829.

Note. Routes of the Russians in 1828.

Retreat of the Russians in 1828.

Routes of the Russians in 1829.



first year's campaign at about a hundred thousand men and three hundred guns. This number includes four thousand Cossacks.

On the 28th of April, war was formally declared by Russia, and on the 7th of May, two corps, the 6th and 7th, crossed the Pruth and occupied the Principalities.

This declaration of war, so closely followed by the invasion of her territory, did not of course take Turkey by surprise, but it found her but ill-prepared for defence. The destruction of her fleet at Navarino in the preceding autumn had given to Russia the undisputed command of the Black Sea, without which, as we shall clearly see, the passage of the Balkan would have been impossible. Her regular Army—or Nizam—was so recent a creation that it had not yet acquired the consistency of disciplined troops. It was also composed mainly of mere lads, it having been thought that it would be easier at that early age to break them in to a system so novel, and so violently opposed to all their national and religious prejudices; and in the third place, the necessity of opposing a large force to the Russian troops collected on her Asiatic frontier prevented her from drawing reinforcements from the northern provinces of Asia Minor, which had always furnished the hardiest and most faithful portion of her Army.

Before entering upon a sketch of the military operations, it may be well to make a few general observations on the theatre of war in European Turkey. They shall be very short, for with an audience composed mostly of military men, I feel as if they were scarcely needed.

The defences of the northern frontier of Turkey are strong and clearly defined. They consist of two almost parallel lines—about sixty miles apart—the course of the Lower Danube and the range of the Balkan.

In modern warfare a river is no longer the formidable barrier that it used to be. But the Danube presents more than ordinary obstacles to the passage of an army advancing from the north. Throughout its whole course from Widdin to the sea—and we do not need to extend our observations beyond Widdin—the right bank dominates the left. It rises, for the most part, abruptly from the water's edge, to a height in many places of two or three hundred feet, while on the opposite bank, the country is low and marshy, intersected with watercourses and flooded during the rainy season. The river varies in breadth from half a mile to a mile. In some parts it is sixty or seventy feet deep, but generally much less; the ordinary current runs between two and three miles an hour.

The line of the Danube is strengthened by numerous fortresses. The chief of these—all of which played an important part in the war—are Widdin, Rustchuk, Silistria, and Brailow. With the exception of the last-named they all stand on the right bank. Widdin and Rustchuk have *têtes-de-pont* on the left bank at Kalafat and Giurgovo, which gave them free access into Wallachia and obliged the Russians to detach a considerable force to keep their marauding parties in check.

Below Rustchuk there are only two points at which the left bank of a river can at all seasons be approached. The first is Oltenitza and

the second is opposite to Silistria. The passage at Oltenitza is defended by an entrenched position at Turtukai on the right bank, which, though of no great strength, sufficed to deter the Russians from attempting to cross, and caused them, as we shall see, the most serious inconvenience.

For several reasons Oltenitza would be the most favourable spot for an invading army to pass the Danube. It is the most direct, or at least the most practicable, line from the Russian frontier to both Shumla and Varna. It avoids the harassing march through the barren and waterless Dobrudscha, and it stands at a considerable distance from any of the great fortresses, which might threaten the line of communication, being twenty-four miles from Silistria, and more than forty from Rustchuk. The breadth of the river at this point is just short of a thousand paces.

Of Brailow we shall have to speak presently.

The country lying between the Danube and the Balkan is an undulating plain more or less well cultivated, and practicable for troops till you reach the wooded spurs projecting from the great mountain range. In the rainy season, however, the Bulgarian roads are well-nigh impassable, while in summer the heat is intense, and the water scanty and bad. Near the southern edge of the great plain stands the fortress, or rather the entrenched camp, of Shumla, which Turkey has always considered her main bulwark against Russian invasion. We shall, however, find that the possession of Shumla, which she retained during the whole war, was no security against the passage of the Balkan, or even the advance upon Adrianople. Shumla is connected with Varna by the fortified post of Pravadi.

The Balkan consists of a chain—or rather mass—of thickly wooded mountains from four to five thousand feet in height and from fifteen to twenty miles in breadth. It is only with the eastern part of this chain that we shall have to do. The passes are of no very great height, but the country is so rugged, and the roads—or rather tracks—so bad that they would have been very difficult for troops to cross even unopposed. There are six passes considered more or less practicable, but as, owing to the incapacity and inertness of the Grand Vizier, no attempt was made to defend them, it would only be a waste of time to describe them, more especially as they have since that time, I understand, been strongly fortified.

I will now endeavour to give as clear and concise account as I can of the movements of the contending armies, beginning with the Russians, who were ready to take the field long before the Turks had begun to bestir themselves.

We have seen that the 6th and 7th corps had crossed the Pruth on the 7th of May. The former, under General Roth, was to occupy Moldavia and Wallachia, which it did without opposition. The troops that had been stationed in these provinces had been withdrawn to garrison the Danube fortresses, and all the resources of the Principalities in grain, and cattle, and forage, had been abandoned to the enemy. The 7th corps, commanded by the Grand Duke Michael, and which was provided with a battering train, was directed against

Brailow, and commenced siege operations on the 21st May. The besieging force amounted to about 18,000 men. We shall find that this was the only siege throughout the war which was undertaken with anything like adequate means. Though it must have been foreseen from the number of fortresses, and from the well known tenacity of Turkish troops behind stone walls, that several sieges would have to be carried on at the same time, only one battering train had been provided; and to this unaccountable neglect we shall find that most of the hardships, and dangers, and losses of the campaign are to be attributed.

Brailow is the strongest of all the fortresses on the Lower Danube. As a rule, the Turkish fortresses are of a very defective construction; they are seldom protected by efficient outworks, and the suburbs are allowed to extend up to the very walls, thus affording shelter to a besieging army.

Brailow was rather more scientifically constructed than most. It was amply provided with stores of all kinds, and defended by a numerous and determined garrison. The walls were armed with 278 guns and mortars.

Moltke gives a curious picture of the manner in which the guns of Brailow—like those of *all* Turkish fortresses, I suppose—were mounted and served. Guns and mortars of all calibres were placed side by side indiscriminately, and served from a common heap of shot and shells of every size and shape—for he tells us that very few shells were round. When the balls were too small, the Turkish gunners wrapped them in a sheepskin to make them fit. The powder was stored partly in private houses and partly in wooden sheds. There were no cartridges, and all the pieces had to be loaded with a scoop. Yet in spite of all this, the guns were well served, and did great execution at short ranges, which a Turk prefers.

After a stubborn defence of twenty-seven days of open trenches, during which several ineffectual attempts were made to carry the place by storm, Brailow capitulated on the 18th June. The garrison was allowed to march out with bag and baggage, and to proceed to Silistria, where they formed the nucleus of the garrison which defied all the attempts of the Russians throughout the whole of the campaign of 1828 and great part of that of 1829.

Meanwhile, the 3rd corps, after a month's delay, had effected the passage of the Danube on the 8th June. It was a daring and hazardous undertaking, and owed its success partly to an unexpected piece of good fortune, and partly to the misconduct of the Turkish troops opposed to them. The spot selected for the passage was Satunovo, nearly opposite to the Turkish fortress of Isaktchi. The left bank of the river is here so low and marshy that the point at which the bridge was to be thrown across could only be reached by laying down a causeway of fascines and planks several miles long, while the landing place opposite was even more difficult, being boggy and overgrown with brushwood.

The Turks had entrenched themselves on the heights facing Satunovo, their left protected by the fortress of Isaktchi. A battery of

fifteen heavy guns commanded both the proposed site of the bridge, and the causeway. Two divisions of infantry were told off to force the passage. The Emperor Nicholas was present to witness the attack. But fortunately for the Russians, before the bridge had even begun to be constructed, the Turkish position was carried by a *coup de main*. A battalion of chasseurs had been brought up as a reinforcement by the flotilla. A tribe of Zaporogue Cossacks who had migrated from Russia into Turkey in the reign of the Empress Catherine, and had done good service to the Porte in former wars against Russia, now suddenly returned to their former allegiance; they had settled on the banks of the Danube, where they plied the trade of fishermen; they now did excellent service to Russia, for under cover of the flotilla, they carried over the Chasseurs in their light fishing boats, unperceived by the enemy, and landed them a little below the Turkish entrenchments. With great boldness, this small body stormed the nearest redoubt, and the Turks—numbering more than 10,000, mostly cavalry—were seized with a panic, and fled precipitately, part to Isaktchi and part to Bazardjik.

The 3rd corps now crossed into the Dobrudscha, and Isaktchi surrendered at the first summons. The main body, which the Emperor accompanied, commenced its march to the south on the 11th June. It did not exceed 16,000 of all arms, for it had detached four columns of from two to three thousand strong, with a few field pieces, to summon the smaller forts of Isaktchi, Matchin, Hirsova, and Kustendje, which threatened both its flanks. This was done in the hope that these places would offer no resistance—a hope, which the result fully justified, for by the time the Russians appeared before them Brailow had fallen, and one after another they surrendered without firing a shot.

We have seen that the 3rd corps did not cross the frontier till a month after the 6th and 7th corps. Yet in spite of this delay, and of the slowness of its subsequent march (it took fourteen days to reach the line of Trajan's Wall, a distance of only seventy-five miles) it was still too soon, if its further operations were to be conducted in combination with the other corps. Silistria, far from being taken, as had been calculated upon, was not yet even invested. The 6th corps, to which the siege operations had been assigned, had failed to cross the Danube at Oltenitza. The 7th corps was still detained at Brailow, for though the place had capitulated on the 18th of June, ten days had been agreed upon for its evacuation. The 3rd corps was therefore unsupported, and with Shumla and Silistria on its flank and rear, an advance upon Varna would have been most hazardous.

Moltke is of opinion that if the 3rd corps had moved boldly upon Silistria, before the garrison had been reinforced by the brave defenders of Brailow, the place might have been taken by a *coup de main*, for the works were both faulty in construction, and much out of repair. Had they succeeded in their attempt, they might then have taken the works of Turtukai in reverse, and opened the passage of the Danube to the 6th corps.

As it was, the 3rd corps remained inactive at Karasu for eight days,

and then continued its march leisurely towards Varna by way of Bazardjik. It was on this march that the Russians first came into collision with the Turks in the open field. The Seraskier had sent forward a reconnoitring force of nearly 8,000 men—mostly cavalry. And the Russian advanced guard somewhat rashly attacked them without waiting for their supports. The Turkish horsemen charged with their usual impetuosity; the Russian cavalry were repeatedly driven back, and it was only the steadiness of their infantry that saved them from defeat. It was not till the artillery came up that the Turks were finally repulsed.

On the 11th July the 7th corps from Brailow joined the main Army at Bazardjik. Towards the end of the month it was further reinforced by the troops which had been observing Silistria, and which were relieved by 10,000 men of the 6th corps from Wallachia. This force had been obliged to make a long detour in order to cross the Danube at Hirsova, having, as we have seen, been unable to force a passage at Oltenitza.

The insufficiency of the forces detailed for the war was becoming every day more apparent. The main Army collected at Bazardjik did not exceed 25,000 men, of whom only 2,500 were cavalry; the investment of Silistria was incomplete. The two divisions of the 6th corps left in Wallachia barely sufficed to keep in check the garrisons of Widdin and Rustchuk, while the force detached against Varna, which consisted of only 5,000 men, was utterly inadequate to invest a fortress with a garrison of double its numbers.

More especially was the want of light cavalry felt throughout the war. Most of the cavalry that the Russians had brought—with the exception of a few regiments of Cossacks—was heavy cavalry. Even that which was called light was not really so, for Moltke states that the Russian Hussar was more heavily equipped than the Prussian Cuirassier. With their large heavy horses they were quite unequal to cope with the active and well mounted irregular Turkish horse even at the beginning of the campaign; much more so, as we shall see, when scarcity of forage, and overwork had begun to tell upon them.

The small number of Cossacks employed in this war is said to have been caused by the fear of lack of forage, but it was in fact the want of light cavalry that made them unable to collect forage. The Turkish cavalry always move in large bodies, which made it hazardous to send out patrols or weak advanced guards. The saying that where you see one turban you may be sure there are a thousand more, is a very true saying.

It was here decided to change the line of operations; and the column quitting the direct road to Varna advanced in the direction of Shumla.

It will now be necessary to look back, and see what measures the Turks had adopted to meet the enemy's advance. It is evident that the Porte had contemplated the possibility—if not the probability—of a Russian army landing near Constantinople. Their undisputed command of the Black Sea, where they had a fleet of 16 line-of-battle ships, 6 frigates, and 7 corvettes, made such an undertaking quite feasible.

Besides this, the Sultan's reforms were very unpopular with the greater part of the Mahomedan population, and an outbreak in the capital was at any time to be dreaded. The bulk of the Army was therefore detained in and around Constantinople, until the advance of the Russians made it absolutely necessary to send forward an army to check their progress.

We have already seen that the Principalities were entirely denuded of troops, while the numerous fortresses on the Danube and in the Dobrudscha were but inadequately garrisoned. It must, however, be borne in mind that the inhabitants of a Turkish fortress instead of being a source of weakness are really a source of strength, every Turk being in possession of arms and well practised in the use of them.

When the Russians crossed the Pruth the passes of the Balkan were still unoccupied. It was not until the 31st May, when Brailow had already been besieged for fourteen days, that the Seraskier—or Commander-in-Chief—left Constantinople for Schumla. On the 3rd of July the Capudan Pacha or High Admiral—whose occupation afloat was gone—marched with a large force to Varna. Lastly the Grand Vizier only quitted the capital at the beginning of August, for Adrianople. But for the unaccountable deficiencies and consequent delays of the Russians both the Turkish lines of defence might have been broken before any effectual measures had been taken to hold them.

But by the time the Russian Army had directed its march upon Shumla, this neglect had been in a great measure remedied. The Seraskier had succeeded in assembling at that point a force of about 32,000 infantry—including 10,000 Arnauts or Albanians, undisciplined but fierce and dauntless soldiers—and 13,000 cavalry. Whatever may have been his military capacity—or incapacity—the Seraskier was a man of great energy, and he set to work at once to improve and to extend the fortifications of the place.

For more than a century Shumla, as I have already remarked, has been looked upon by the Turks as the main bulwark of the Empire, and in all their wars with Russia it has been occupied as an entrenched camp. In 1774, and again in 1810, it successfully resisted the attacks of the Russians, and we shall see that throughout the whole of the campaigns of 1828 and 1829 it again defied all their attempts to make themselves masters of it. Whether its defence on this occasion was not too dearly purchased by the neglect of still more important points is another question.

The position of Shumla is a very striking one as you approach it from the north or from the east. It stands on a plateau some eight or nine hundred feet above the great plain of Bulgaria forming a spur from the Balkan, but separated from the main range by the valley of the Kamstchik. The town itself is not fortified. It is, however, effectually protected on three sides by a chain of wooded hills which form as it were an amphitheatre round it, while the fourth is defended by a continuous line of works carried along the outer ridge of the plateau and abutting at either end on precipitous heights. This line consists of earthworks with a deep but narrow ditch, and its length is about 8,000 paces. To the north of the town lies the en-

trenched camp occupied by the barracks of the infantry. The cavalry were picketed in a sheltered and well watered valley a little in rear of the camp. 500 yards in advance of the fortified front a chain of redoubts was extended across the plain. Several roads converging upon Shumla afforded means of obtaining supplies from districts not occupied by the enemy.

An assault upon a place so strong, and held by so large a garrison, was of course not to be thought of, nor indeed would the possession of Shumla have been an unmixed advantage to an invading army. It would, it is true, have made its flank more secure, but it would not have opened the passes of the Balkan, from which it is too far distant. On the other hand the large force which was shut up in the entrenched camp would have been set free to occupy those passes and bar the further progress of the Army.

A complete investment of the place was equally out of the question, not only on account of the extent of country that would have to be guarded, but because of the danger to the investing force from the frequent and vigorous sorties of a garrison so strong in cavalry. Had Varna by this time been hardly pressed, as it might well have been, the Russian Army might have taken up a strong position at some distance from the place in the hope of drawing the Seraskier out of his entrenchments for the relief of that fortress, but the siege of Varna was still unaccountably delayed for want both of guns and of men.

Under these circumstances it was decided to make at least a partial investment of the place, and the Russians proceeded to throw up a chain of redoubts in front of the Turkish lines. They had, however, the great disadvantage of being within range of the enemy's heavy guns, to whose fire their own field-pieces were unable effectually to reply. At the same time they had the mortification of seeing long strings of camels laden with provisions and ammunition entering the camp daily from the hills behind the town. This led to an attempt to close the approaches from that side, but it was found too hazardous on account of the vigorous sorties made by the garrison, and it was soon abandoned.

Things continued thus for many weeks, the sorties of the Turks becoming every day more daring. Colonel Chesney relates that the most daring of these sorties were led by Hemin Pasha, whom he states to have been the Mameluke who alone escaped from the massacre of his comrades at Cairo in 1811, by leaping his horse over the ramparts of the citadel. His ambition was to capture the Emperor, who was present with the Army at that time, and to exact as his ransom the restitution of the Crimea to Turkey.

On the 27th August, the Seraskier made a night attack—a phenomenon, Moltke remarks, in Turkish military history—on two of the principal Russian forts. One of them was successfully stormed, and the guns carried off in triumph. On the 10th September he made a still more vigorous attack before daylight with a force of 8,000 men, but fortunately the Russians had been warned by their Bulgarian spies, and were prepared to meet it.

At length the Russian General perceived the uselessness of persever-

ing in the investment. The army had lain for more than six weeks before Shumla, exposed to the fearful heat of a Bulgarian summer; Insufficient food, and bad water, had filled the field-hospitals to overflowing, and there was no place of security to which their sick could be removed. Scarcity of forage and over-work were carrying off their horses at the rate of more than a hundred a-day, and their reduced and enfeebled cavalry was no longer able to protect their convoys from the flying columns of Spahis which hung about their communications.

Moltke points out that during these months—August and September—the position of the Russians was everywhere critical. The blockade of Silistria was altogether ineffectual; the siege of Varna had only just begun—and not under promising auspices, while Wallachia was seriously threatened by the enterprising garrisons of Widdin and Rustchuk. Had the Turkish commanders shown half as much capacity as they did energy, the result of the campaign could not but have proved disastrous to the Russians.

The siege of Varna had been formally opened by the Emperor on 3rd of August. The Russian fleet, under Admiral Greig, had arrived a few days before bringing reinforcements, and had anchored a mile and a half from the town prepared to take part in the siege. The besieging army, under Prince Menschikoff, did not at this time exceed 9,000 men, but early in September it was reinforced by the 2nd corps and a division of the Guards, which raised its numbers to 18,000 or 20,000, and enabled Menschikoff to complete the blockade. But still there was no battering train, though Brailow had fallen on the 18th of June. "The fate of this battering train," says Moltke, "is involved in mystery. After the fall of Brailow it was absent everywhere." They were obliged to make shift at last with ship guns.

On the other hand, the Capudan Pasha, whose departure from Constantinople we have already mentioned, had arrived at Varna on the 17th July with 5,000 men, mostly artillery, and had entered the place under the very eyes of the Russians. The garrison now numbered 15,000 men, of whom nearly half were Albanians. The walls were armed with 162 guns.

I must refer my hearers for all details of this memorable siege to the two chapters that Moltke has devoted to this subject. It would be impossible to abridge them without their losing all their interest. It was of vital importance to the Russians to make themselves masters of the place without delay, for their situation was becoming critical; their daily losses were heavy; disease was rife in their camp—it was said even the plague. The position of the main Army before Shumla was precarious; and a large army, under the command of the Grand Vizier himself, was advancing to the relief of the place. The siege operations were therefore pressed with all the vigour possible. Nothing could exceed the energy and perseverance of the assailants, unless it were the determined courage of the defenders. The latter, long after the siege had commenced, maintained their positions outside the walls, and surrounded themselves with a labyrinth of lodgements which sometimes interfered with the Russian approaches. The

siege was carried on more by means of mines and galleries than by batteries, and though several practicable breaches were made by the explosion of the mines, and even a lodgment effected on one of the bastions, the ardour of the defence never slackened. Colonel Chesney relates that the Capudan Pacha worked with his own hands to close the breach, and adds, that "he encouraged his men with a stick!" The fierce obstinacy with which the Armaouts defended the ditch to the last, neither giving nor receiving quarter, is almost incredible. Moltke's remark is indeed true,—that defence only begins with a Turk where it ends with any other troops.

Meanwhile the Grand Vizier's zeal had cooled, and halting his army on the Kamatchik, he sent Omar Pacha with 15,000 men to attempt the relief of Varna. Omar advanced within a few miles of the fortress, and then, in Turkish fashion, he entrenched himself strongly at the village of Kurtepe.

Prince Eugene of Wurtemberg was sent to dislodge him, and was making arrangements to do so when he received peremptory orders from the Emperor to attack the position in front. The Emperor had been led to believe that the Turkish force was much weaker than it was, nor was he acquainted with the rugged and wooded nature of the ground which made their position almost unassailable. So thick was the wood that the Russian guns could not be brought into action, and the battle was a succession of hand-to-hand encounters. The result was undecided, but the gallantry of the Russian troops had a great effect upon the Turks; and though Prince Eugene had to fall back, and the road to Varna was open to him, Omar Pasha did not avail himself of the opportunity. He remained inactive in his entrenchments, though the explosion of mine after mine must have warned him that the fall of Varna was imminent. And when, after a few days, he saw the Russian flag floating over the ruins of the fortress, he made a precipitate retreat beyond the Kamatchik. For fourteen days this relieving force had been within five miles of Varna without rendering any assistance to the hard-pressed garrison.

The fall of Varna was, after all, the work of treachery. It seems strange that the Commander who had conducted so heroic a defence should turn traitor at the last. There is, however, no doubt that the intelligence of some intrigue that was being carried on against him at Constantinople led Yussuf Pacha to betray his trust. Accompanied by a large body of followers he sought the Russian camp, and threw himself on the mercy of the Czar. The gallant Capudan Pasha refused to surrender, and retired into the citadel with several hundred men. The siege had lasted eighty-nine days, twenty-seven of which with practicable breaches. Two-thirds of the garrison had fallen, and Varna was a heap of ruins.

There may perhaps be some few here present besides myself who remember the deep interest with which the progress of the siege of Varna was watched in England. A war between Turkey and Russia was not, however, supposed at that time to be fraught with such serious consequences to the balance of power in Europe as it has been of late years, nor were our sympathies with the defenders height-

ened as in the case of Kars and Silistria in 1854 by the gallant part that our countrymen took in the defence.

I have only time to notice briefly the siege of Silistria. It commenced on the 21st of July, at the same time that the main Army arrived before Shumla, and the investment of Varna began.

Silistria has played an important part in every war between Turkey and Russia. It commands one of the most practicable passages of the Danube, and threatens the flank of an army advancing upon either Shumla or Varna. It was taken by the Russians in 1810, and razed to the ground; but it was soon rebuilt. In 1828—and indeed so late as 1854—the fortifications of Silistria were very imperfect. It had no regular outworks—only a few lodgments, as Moltke calls them, in front of the gates, which would otherwise open on the plain. It is surrounded by a low rampart and a dry ditch, which one of the English defenders of the place contemptuously described to me as being what a good hunter would take in his stride.

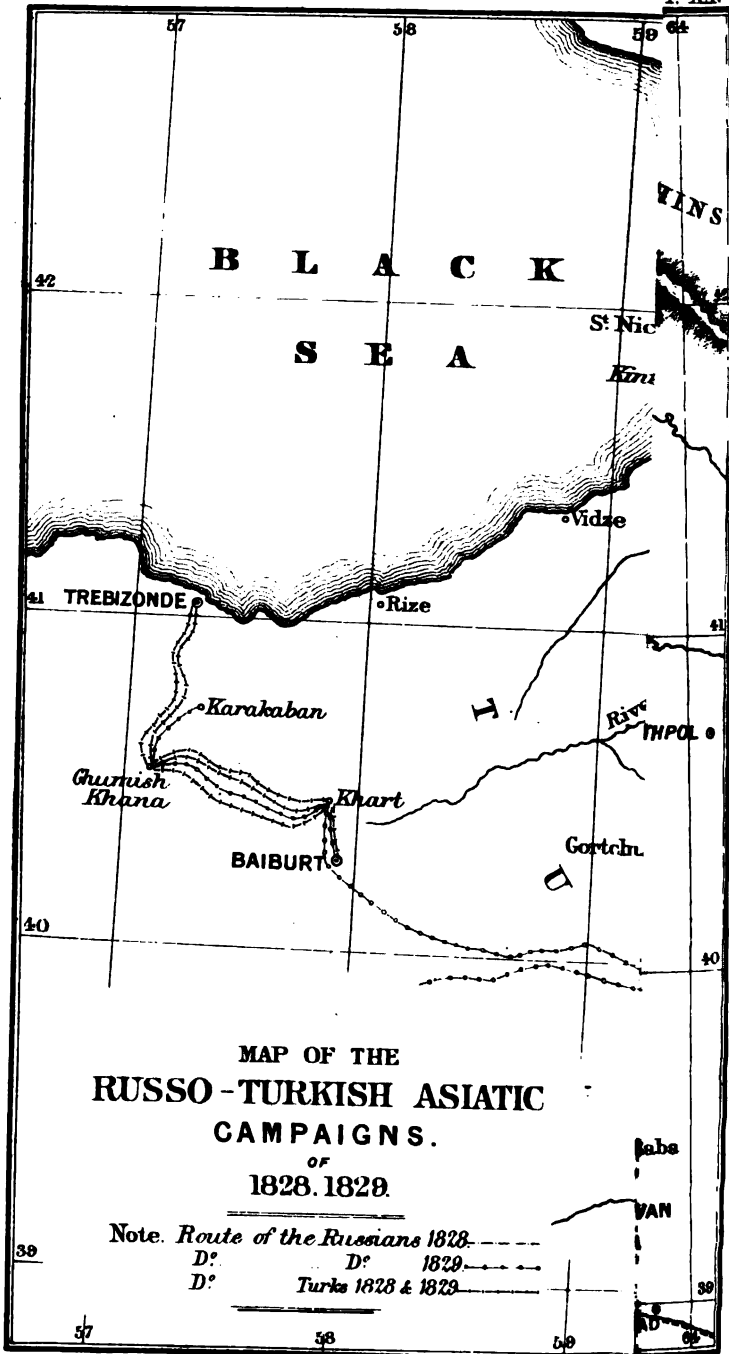
The place is commanded from the adjacent heights, and is also within range of the opposite bank of the Danube, which at this point is only a thousand paces in breadth.

The garrison had been reinforced by a part of those of Brailow and the small forts of the Dobrudscha, and the town contained about 6,000 inhabitants capable of bearing arms. A Russian flotilla of thirty-six vessels reached Silistria on the 10th August, but it was of little use. It did not even capture or destroy a very inferior Turkish flotilla which was aiding in the defence, nor was any attempt made to throw a bridge across the river, which would have facilitated the arrival of supplies and secured a safe line of retreat. In the middle of October the besieging force was raised to 30,000 by the arrival of the 3rd corps.

Finding that the place could not—or rather, would not—be taken, it was decided to convert the siege into a blockade, but the weather had now broken up. Incessant rain flooded the trenches, followed by snow and piercing cold. Sickness increased to an alarming extent, and on the 10th November, after an ineffectual attempt to terrify the garrison into surrender by a bombardment of forty-eight hours, the siege was raised. The retreat, though unopposed, was disastrous; the roads were so deep that it required 200 men to drag a single gun; after undergoing severe hardships the besieging Army at length succeeded in recrossing the Danube at Hirsova.

The season was now too far advanced for further operations, and it was decided to place the army in winter quarters. The 6th and 7th corps were cantoned in and around Varna and Pravadi; the rest of the army in Wallachia and Moldavia, excepting the Guards who were moved back into Bessarabia. The line occupied by the Russians extended from Varna to Craiova, a distance of 250 miles, and it was cut in two by the Danube. Only in presence of such an enemy as the Turks could such winter-quarters have been taken up with impunity. But the Turkish Irregulars, who were the most likely to harass them, had disbanded themselves on the approach of winter and returned to





their homes in Asia. "They had," they said, "left their winter-stock-ings behind."

In summing up the results of the campaign, we find that after the fall of Brailow, and the small forts of the Dobrudscha, the only real success had been the capture of Varna—how hardly won we have already seen. Shumla and Silistria had defied all the efforts made to take them, and in the numerous engagements that had taken place in the open field, the results had been quite as often favourable to the Turks as to the Russians.

As Moltke remarks, "When we consider the enormous sacrifices that the war cost the Russians in 1828, it is difficult to say whether they or the Turks won or lost it. It remained for a second campaign to decide the value of the first."

We must now cast a glance at what had been going on during this time on the Asiatic frontier of Turkey; but it will not be necessary to enter into much detail, as the military operations in that quarter had only been important in so far as they had obliged the Turks to divide their forces.

Until the year 1801 the Caucasus had formed the southern boundary of Russia, and the Turkish frontier had been a very defensible one. Her actual frontier was far less well defined.

The war between Russia and Persia, which had begun in 1826, had just been brought to a successful close by a winter campaign, and General Paskevitch's army was now disposable for operations against Turkey. It consisted of about 30,000 men with 130 guns.

To this force the Turks were at first able to oppose only a small and disorganised army.

The campaign opened with the siege and capture of Anapa by a naval force, assisted by a detachment from the Army of the Caucasus. But before Anapa had fallen, the Russian army had begun its advance from Tiflis. It moved in three columns, the right towards the Black Sea, the left towards Armenia, and the main body towards Kars. On the 14th June, about 15,000 men crossed the Araxes near Goomri, an important Russian frontier-post, now strongly fortified, and continued its march unopposed to Kars, where it took up a position south of that fort, between it and the Army of the Seraskier.

It is unnecessary to describe a place so well known as Kars has since become. It had always been one of the bulwarks of Asiatic Turkey, and had successfully resisted Nadir Shah in 1735 and a former invasion of the Russians in 1807.

On the present occasion it did not uphold its former (or its future) fame. The weak walls of the suburbs were soon breached, and the suburbs themselves occupied after a short but sharp resistance. The fall of the town followed within a few days, and on the 23rd of June the Pasha surrendered the citadel. The relieving army was actually within sight when the place fell. 150 guns and large stores of ammunition fell into the hands of the Russians.

The plague now broke out in the Russian camp; this delayed fur-

ther operations and gave the Seraskier time to collect some 35,000 men, with whom he took up a position in front of Ardegan. This movement prevented Paskevitch from advancing upon Erzeroum, as he would have left this army in his rear, so he made a demonstration against Ardegan, which caused the Pasha to beat a hasty retreat across the Saganlugh mountains. He then doubled back and appeared unexpectedly before the strong fort of Akhalkalaki, which was taken by storm after a short bombardment. The garrison resolutely refused to surrender, and two-thirds of their number perished in the assault.

I may here mention that the inhabitants of this bleak mountainous part of Asia Minor are among the hardest and bravest of the subjects of the Porte, and, I may add, the most fanatical.

Paskevitch next moved against Akhaltsik, a still stronger place. Short as is the distance, it took him ten days to reach it, so difficult was it to carry troops and guns through that densely wooded and mountainous country. He arrived just in time to take up a strong position commanding the west front of the fortress, and to throw up some entrenchments, before the Seraskier appeared with a large force to relieve the place. The Pasha imprudently divided his force, and after an obstinate resistance the Russians succeeded in carrying his whole position. The Seraskier, after losing 10 guns and 1,700 men, threw himself into the fortress with several thousand men. The rest of his army dispersed.

The defence of Akhaltsik was as heroic as that of Brailow. After a lodgment had been made in one of the bastions, the Russians advanced to the assault. For thirteen hours the garrison maintained a desperate resistance; the Russians fought with equal obstinacy. At length they carried a howitzer by hand across the ditch and placed it on the flat roof of a church. A shell set fire to the town, which continued to burn throughout the night, lighting up the fierce conflict. At daybreak the fort surrendered, being no longer tenable.

After the fall of Akhaltsik nothing of any consequence was undertaken by the main army, but the left wing had made itself master of the important town and fortress of Bayazid. This secured to the Russians the possession of the whole country as far as the Saganlugh range, which furnished them with a good base for the operations of the next year's campaign.

We must now return to the more important theatre of war in Europe, and relate the events of the decisive campaign of 1829.

The command of the Russian Army had been transferred to General Diebitsch, who had served in the preceding campaign as Chief of the General Staff. He joined the army in Moldavia at the end of February, and applied himself diligently to the re-organisation of all departments of the service. The cavalry was remounted, and the front ranks of the Hussar regiments armed with lances as a better protection against the swords of the Spahis; the Cossacks were increased to 22 polks, or regiments, of about 250 each; the Commissariat was provided with 2,000 Asiatic camels, a mode of transport well suited to the plains of Bulgaria.

The constitution of the four corps d'armee remain unaltered, but

several changes were made in the commands. Count Pahlen commanded the 2nd corps, General Krassowski the 3rd, General Roth the 6th, and General Rudiger the 7th. Altogether the army amounted to 48,000 infantry, 16,000 cavalry, and 4,000 artillery with 300 guns. This force was not larger than that with which the previous campaign had opened, but it was stronger in artillery and light cavalry.

But before the army began its advance operations had already commenced by sea. The possession of a secure harbour south of the Balkan was of the utmost importance before attempting the passage of that range. It would save the difficult and laborious task of transporting military stores across the mountain passes, and would facilitate the provisioning of the Army.

Bourgas would have been the most suitable spot but for its proximity to Aidos, where the Turks had assembled a large force. Sizeboli was therefore selected, and so early as the middle of February it was occupied by a Russian squadron without serious resistance. It had the advantages of a strong position and a safe harbour, but was at a greater distance from the Russian line of operation than Bourgas.

The Seraskier was ordered to advance at once from Aidos and retake the place, but he delayed obeying the order for several weeks, and when at last he arrived before Sizeboli he found the Russians too firmly established to be dislodged.

Nor was a subsequent attempt by sea more successful. The Turkish Admiral on his way to Sizeboli fell in with a solitary Russian frigate, which he took; and then he thought it best to return to Constantinople with his prize.

No further attempt was made to retake the place, which remained in possession of the Russians throughout the war.

The advance of the Army did not commence till May. The weather and the floods were assigned as the cause of this delay, but in truth the preparations were not completed earlier.

Part of the 2nd and 3rd corps now crossed the Danube at Hirsova and joined the 6th and 7th corps, which had wintered around Varna. The other divisions of the 2nd and 3rd corps were detained in Wallachia, awaiting the construction of a bridge at Kalarasch a little below Silistria.

Diebitsch was forced to open the campaign with a siege, which ought not to have been left for the second year of the war. The capture of Silistria was an absolute necessity before the Army could advance. Its garrison was large, and it commanded every possible line of operation. Diebitsch arrived before it on the 17th May, and found it exactly in the condition in which it was left in the preceding autumn. The besieging army amounted to 15,000 men (shortly increased to 21,000) and 88 guns. The garrison, with the armed inhabitants, numbered some 20,000. Diebitsch proceeded with great caution. He would not even assault when there was a practicable breach. He had learnt to respect the Turk behind a stone wall, and preferred the surer though slower process of mining.

After a brave defence of forty-four days the place surrendered, and the garrison became prisoners of war.

Diebitsch had, before the conclusion of the siege, handed over the command to General Krassowski, and had joined the main Army at Shumla. Important events had already taken place in that quarter, and this time the Turks had taken the initiative. The new Grand Vizier, after re-organizing the motley force he had found at Shumla, had quitted his entrenchments on the 16th of May and advanced in the direction of Pravadi with some 20,000 men, hoping to overwhelm the force under General Roth. The 6th and 7th corps were very weak from the losses of the preceding campaign, and the sickness of their winter quarters around Varna. They did not muster more than 14,000 effectives of all arms.

On the 17th the Vizier reached the village of Eski Arnautlar, where a force of Russians—3,000 strong—had taken up a well chosen position covered by five small redoubts. These the Vizier instantly attacked with his left wing, while with his right wing he assaulted the entrenched works of Pravadi. Both these attacks were repulsed after fifteen hours of hard fighting, and Russian reinforcements coming up during the night, the Vizier fell back upon Shumla. Such vigorous action was a great contrast to the supineness of the late Grand Vizier. Reschid Pacha had set his troops an example of personal bravery, and both he and his second in command had been wounded.

On the 28th May the Vizier again quitted Shumla at the head of 40,000 men, leaving only four regiments to guard the entrenched camp. He directed his march upon Kustendje.

It was the intelligence of this move which had decided Diebitsch to leave Silistria. It was his intention to march with as many men as could be spared from the besieging force upon Pravadi, to form a junction with the 6th and 7th corps, and then to throw himself across the road from Pravadi to Shumla, so as to intercept the Pasha's retreat and force him to fight in the open field. Should he succeed in doing so, he felt confident that discipline would prevail over numbers. This bold decision decided the fate of the campaign and of the war. The force with which it was undertaken numbered 21,000 infantry, 7,000 cavalry, and 146 guns.

Time will not allow me to relate the movements of the two armies which preceded the decisive battle. The Vizier seems to have remained in total ignorance of Diebitsch's plans, and was retracing his steps leisurely towards Shumla—expecting to have to deal only with General Roth's weak force. But on the forenoon of the 11th June, 28,000 Russians barred his further passage. The battle so much desired by Diebitsch took place at Kulewtcha. The Turks resolutely attempted to cut their way through, and for some hours their efforts were successful. The Russians lost great numbers of men and several guns; but when at length they had succeeded in driving the Turks back to their original position, which was a very strong one, a sudden panic seemed to come over them. They broke their ranks and disappeared singly in the thick woods. Scarcely a prisoner was taken, but the whole of the artillery and baggage fell into the hands of the Russians. The Vizier with 600 horsemen succeeded in reaching Shumla in safety by a circuitous route. Within a fortnight the bulk

of the Army also found its way thither by twos and threes. "A Turkish Army," as Moltke observes, "is not easily destroyed, it is only dispersed."

The former campaign was lost by the inactivity of one Grand Vizier. The present was lost by the too enterprising spirit of another.

Diebitsch at length found himself in a position to attempt the passage of the Balkan. Shumla, indeed, was still in the hands of the enemy, but without an army, Shumla was of little importance. A corps of observation would suffice to keep its beaten and disheartened garrison in check. The fall of Silistria was hourly expected. With the Dobrudscha, and the sea for a basis an advance would no longer be hazardous. The season was favourable, for the great heats had not yet set in. The health of the Army made it desirable that it should quit its present unhealthy positions.

All these were arguments in favour of an immediate advance, but the Russian Army was too weak for such an undertaking. Diebitsch had but 25,000 men in all, and if he detached 10,000 to mask the entrenched camp of Shumla, there would remain but 15,000 available for active operations. It seems unaccountable that the experience of the last year's campaign should not have taught Russia the insufficiency of her preparations. Four precious weeks were lost while awaiting the fall of Silistria and the arrival of the besieging force.

On the 15th June, Diebitsch removed the head-quarters to the neighbourhood of Shumla. It gives an awful picture of the horrors of this war to read that while crossing the battle-field of Kulewtcha the escort of the Commander-in-Chief was regularly attacked by an enormous pack of dogs, which were devouring the corpses of the slain.

At length the force under General Krassowski arrived. It was left to watch Shumla. General Roth with the 6th corps was ordered to advance along the coast roads leading from Varna to Bourgas, while General Rudiger with the 7th corps was to cross the mountains by the road from Pravadi to Aidos. General Pahlen with the 2nd corps was to act as a reserve to both these columns. The head-quarters accompanied the reserve.

Meanwhile the Grand Vizier, alarmed for the safety of Shumla, chose this very moment, when the Russian Army was in full march for the Balkan, to order a force of nine regiments of regular infantry, and several thousand Albanians, which had been allotted for the defence of the passes, to join him in the entrenched camp.

Consequently the two Russian columns, which had advanced to the Kamstchik, effected the passage of that river at Kiuprikoi without any serious opposition. The head-quarters with the reserve followed closely, and on the tenth day after leaving Shumla, the whole Russian Army was assembled around Roumelikoi to the south of the Balkan-range, and in free communication with the fleet.

In this short time it had accomplished a march of above a hundred miles through an unknown and difficult mountainous country. The passage of the Balkan had, after all, been effected by one single route.

Aidos still lay before them on their line of march. It is a town of some 25,000 inhabitants lying at the foot of the Balkan, and, though unfortified, was very capable of defence. The Vizier, alarmed when too late by the Russian advance, had hastily sent a force of from ten to twelve thousand men across the mountains to occupy this important post; but they made but a weak defence, and the 7th corps quickly drove them out of the town and took possession of it. The filthy state of the Turkish camp at Aidos is said to have sown the seeds of the diseases which from this time forth raged among the Russian troops.

Diebitsch's Army was by this time reduced to less than 25,000 men of all arms; but it had a secure basis at Bourgas, and an ample supply of provisions. Intelligence had been received from Adrianople that there were only a few thousand men collected for the defence of the city, and that no serious resistance need be anticipated. Diebitsch, therefore, decided to advance, knowing the effect that the possession of Adrianople would produce at the capital, and sent on the 2nd corps as an advanced guard.

The rest of the army did not at once follow, for a report had reached the head-quarters that the Pacha of Rustchuk had effected a junction with the Vizier, and that the Russian line of communication was seriously threatened. This report induced Diebitsch to concentrate his forces, and to move along the foot of the Balkan to Slivno, about 70 miles west of Bourgas. Rumour had exaggerated the danger. He found only a small force at that place, which he quickly dispersed, and he then resumed his advance upon Adrianople, from which he was no farther than he had been at Aidos.

The Turkish Army was now thoroughly demoralized. Fortified positions were abandoned on the approach even of cavalry unsupported, and it was clear that any measure however bold might be ventured upon with impunity against such a foe.

Indeed the only enemy the Russians had to encounter on the march was the intolerable heat, aggravated by scarcity of water, for the Turks had destroyed the fountains along the road. Fever was increasing in the camp at a fearful rate, and it was with difficulty that the enfeebled troops could accomplish a daily march of ten miles.

At Buyuk-Derbend there is a formidable defile, but happily for the Russians it was undefended.

At length, on the 19th August, four weeks after crossing the Balkan, 20,000 men, enfeebled as we have seen by disease, encamped before the gates of Adrianople. Out of a force of 70,000 men, with which the campaign had opened in May, this was all that could be brought together for a further advance of more than a hundred and thirty miles upon the capital. It would scarcely be too much to say, looking at it from a military point of view, that the Russians were no nearer Constantinople at the end of the second campaign than they were at the beginning of the first.

Adrianople is an open town, and though its position is strong, it would have required a large force to hold it. The garrison, composed mainly of fugitives from Aidos and Slivno, had no heart for fighting.

and without waiting to be summoned they offered to capitulate. Diebitsch gladly accepted the offer with the conditions that they were to give up their arms, their standards, and their guns. These hard terms were accepted without hesitation, and the Russians marched into Adrianople, to use Moltke's words, "as into a friendly town, "where nothing but the garrison is changed."

Still Marshal Diebitsch's position was a critical one in spite of his success; and it caused so much anxiety at St. Petersburg, that a fresh levy of 90,000 men was ordered, lest the negotiations set on foot at Constantinople should fail. Rest, so far from restoring the health of the troops, seemed to aggravate the disease that had so long hung about them. Colonel Cheaney, who was present at a grand review held at Adrianople some months later, states that there were less than 13,000 men of all arms on the ground.

But General Diebitsch put a bold face on the matter, and in order to strengthen the hands of the Ambassador at Constantinople, he advanced in three columns towards the capital. Report, fortunately for him, had magnified his force to 60,000 men, and as there was not even a show of opposition made to his advance, the weakness of his actual numbers escaped detection.

His boldness was rewarded, for the Porte, alarmed by the approach of the enemy, and still more perhaps by the fear of an outbreak in the capital, signed, on the 28th of August, the Treaty of Adrianople.

My time will not allow me to relate the events of the Campaign of 1829 on the Asiatic frontier. That campaign had no influence on the result of the war, nor was there anything remarkable in the operations on either side. The Turks displayed indeed somewhat more vigour and enterprise than they had done in Europe; not only did they take the initiative, but they did what is very foreign to their habits:—they undertook a winter campaign in the hope of recovering the ground they had lost in summer. On the 18th February, they made a bold but unsuccessful attempt to re-take Akhaltsikh by escalade, and when this failed, they commenced a regular siege. But a Russian force soon came to its relief and they were defeated with heavy loss.

The defection of the Pasha of Mush at this time deprived the Turks of some 12,000 Kurdish cavalry—a very serious loss. In every quarter success attended the operations of the Russians. In June, Paskevitch forced his way across the Saganlugh range, and after defeating the Army with which the Seraskier attempted to cover Erzeroum, he pursued him to the gates of that city and forced him to surrender.

He then advanced upon Trebizonde, but finding the country almost inaccessible for artillery, and meeting with a more serious opposition than he had expected from the warlike Mahomedan tribes of that mountainous district, he abandoned the project and fell back upon Erzeroum.

Some desultory fighting took place after this at Baiburt and at Bayazid, but intelligence of the signing of the Treaty of Adrianople put an end to hostilities before any decisive blow was struck. The

most serious result of the war in Asia was the loss of Akhaltsikh, which this Treaty handed over to Russia.

It will be unnecessary for me to make more than a very few general observations on the conduct of this war. Those who wish for a critical *résumé* of the operations of both armies will find it in the concluding chapter of Moltke's History. Such a war as that between Russia and Turkey cannot be judged by the ordinary rules of European warfare. The best recognised principles of strategy were systematically ignored both by Turks and Russians; by the former from sheer incapacity or inertness, by the latter from a more or less well-founded contempt of her enemy.

If we are to judge of this war simply by its results, it is certainly one of the most successful wars on record. It had the effect of greatly strengthening the influence of Russia in the east of Europe, and of heightening her prestige in the west. But it is another question whether it has in anything like an equal degree increased her reputation or given fresh proof of her strength, as a great military power.

The energy and determination of her officers, and the courage and constancy of her soldiers, under difficulties and trials of no ordinary kind are indeed beyond all praise; but a careful study of this war not only reveals an unaccountable want of foresight in her military administration, but leads one to doubt whether the power of Russia, at least for offensive warfare, has not been greatly overrated.

The most interesting question for us, especially at the present moment, is whether the campaigns of '28 and '29 will throw light upon any future war that may be carried on between the same combatants, and on the same ground. One thing is clear: which is, that, should such a war unhappily arise, it will take place under greatly altered conditions. I am looking at the question solely from a military point of view.

On the one hand, a Turkish army of the present day would be very different from what it was now nearly fifty years ago. The Nizam would doubtless be more efficient soldiers than they were then; but, if I am not greatly mistaken, the irregular troops, both horse and foot, which did such good service at Varna and Shumla, would be found to have lost much of that daring courage which made them prefer death to surrender. The Bashi-Bazouk of 1876 is but a sorry representative of the Spahi or Arnaout of '28 or '29. Nor is it to be expected that after so severe a lesson, the frontier fortresses—still less the passes of the Balkan—will again be neglected.

On the other hand, the Russians are not likely a second time so greatly to miscalculate the forces required for a successful invasion of Turkey. They cannot expect again to have the undisputed command of the Black Sea, which alone enabled Marshal Diebitsch to add the proud title of "Za Balkanski"—or crosser of the Balkan—to his name; and in crossing the Pruth they will feel that they are embarking upon an undertaking which will task to the utmost the strength of the Russian Empire to bring to a successful issue.

AN ACCOUNT OF THE CHINESE NAVAL ARSENAL AT FOO-CHOW: TRANSLATED AND ABRIDGED FROM M. GIQUEL'S PAMPHLET.¹

By Commander CYPRIAN BRIDGE, R.N.

DURING my service in China, I have had the good fortune of making the acquaintance of Lieutenant Giquel, of the French navy, whose name is pre-eminently distinguished amongst those of the group of able French Naval Officers who have lately exercised an important influence on the course of affairs in more than one ancient State in the far East. With his permission, I make use of an account published by him of the arsenal at Foo-Chow, and of the work done there. The importance of this establishment, and the results achieved in a very few years, are too striking to render necessary any apology for bringing them to the knowledge of the members of the Royal United Service Institution.

Object of the Arsenal.

The arsenal of Foo-Chow is not, as this designation might seem to imply, an establishment intended for the manufacture of arms and munitions of war. It is a collection of building-ships and workshops designed for the construction of ships, and having annexed a factory built for the rolling of iron in bars and sheets. The object in view in establishing it has been to furnish the Chinese with ships of war and transports, to instruct them in the methods of building and managing these vessels, and to take advantage of the metallic wealth, notably that of iron, possessed by the province of Fohtsien.

Reasons for Selecting the Port of Foo-Chow.

The harbour can be easily defended, as the entrance of the Min River is studded with islets and elevations well adapted to the reception of forts, and, some ten miles higher up, the hills along which it runs contract its course sufficiently for the laying down of a few torpedoes to render its passage absolutely impossible. The anchorage, quite accessible to vessels with a draught of water of 22 to 23 feet, was found to suffice for ships of the dimensions which it was decided to construct, and they could be moored alongside the frontage of the arsenal at the quays, which was necessary to facilitate the work of construction. Beforehand it was known that the province would

¹ "L'Arsenal de Fou-tchéou, ses résultats." Par Prosper Giquel, Lieutenant de Vaisseau, Directeur. Shanghai: 1874.

furnish iron, piles for the foundations of the workshops, that the coal of Formosa was not far off, and that manual labour was cheap.

Negotiations relative to the Establishment of the Arsenal.

M. Giquel had made the acquaintance of a distinguished Mandarin, his Excellency the Viceroy Tso-Tsong-Tang, when at the head of a Franco-Chinese corps, he had been engaged, in company with the troops under his Excellency's command, against the rebels in the province of Che-Kiang. On the conclusion of the campaign, at the end of 1864, the Viceroy had requested him to furnish a plan for the construction of a naval arsenal. The one submitted was not definitely approved of till the end of 1866, when the contracts between M. Giquel and the Chinese Government were signed.

Programme of Foundation.

The programme drawn up was as follows:—

1. Establishment of workshops and slips suitable for the construction of ships and their engines.
2. Establishment of schools for the education of leading men in the constructor's department, of captains, and of engineers for the ships.
3. Engagement of a sufficient number of Europeans to conduct the works and to instruct the Chinese.
4. Laying down of a patent slip, on Labat's system, similar to that at work at Bordeaux, for the repair of vessels.
5. Establishment of an iron-foundry for rolling bars and sheets out of the pigs of rough iron furnished by the province, and the old iron that can be procured in China.

Beginning of the Works.

At the beginning of 1867, some preliminary works, such as the quarters for the *personnel* and the storehouses, were taken in hand; but it was only in the month of October in the same year, on the return of M. Giquel from a voyage to France to collect the necessary *matériel* and the staff, that the works of the arsenal, properly called, made a real start. The residents of Foo-Chow still remember the surprise and doubt experienced by them when they saw the bare paddy-fields upon which the works had to be erected. None of the plant purchased in France had arrived; the founders of the undertaking were at a port without resources in the shape of machinery and European implements. However, it was necessary to set to work; a small square hut, the only one on the ground, served as a smithy; in it were built two forges, and from them were turned out the first nails. With native carpenters, pile-drivers were constructed for driving the piles, and the laying down of a slip was proceeded with, on which, three months afterwards, the director—with appropriate solemnities—laid the keel of a transport. During this time, the embanking was vigorously pushed on by means of 1,200 men; for it was necessary to raise the ground five feet to elevate it above the highest rising of the river; and as the very natural impatience of the Chinese had to be

allayed when they wished to see results without delay, the construction of a series of wooden workshops was begun, in which were placed a part of the machines and tools as they arrived from France. These workshops still exist, and the arsenal presents the somewhat common spectacle in new establishments abroad, of buildings run up in haste standing beside permanent structures built with a perfect luxury of materials and workmanship.

Workshops and Building Works.

The following is a list of the shops, factories, &c. :—

The *Iron-works* (*usine métallurgique*), in which are the buildings for the large forges and rolling-mills, include a space of 5,011 square yards. The large forges are provided with six steam-hammers, one single-action hammer, with a power of 138 cwt., made at the arsenal, one double-action Farcot hammer; the remaining four are single-action and smaller. There are sixteen fires for heavy jobs and six reheating furnaces. This factory has up to the present (February, 1874) turned out the forgings for nine marine engines of 150 horse-power, including the shafts and cranks. There have also been forged the large pieces, such as bower anchors of 27 cwt. and boats' davits, required as ships' fittings.

The *Rolling mill* (*atelier des laminoirs*) has six furnaces and four apparatus—one for sheet-iron, one for stout iron and angle-iron, one for small sizes, and the fourth for copper. They are worked by an engine of 100 horse-power. They can, working day and night, turn out 3,000 tons of plate iron a year.

The *Metal mill*, or coppersmith's shop (*chaudronnerie*), has one engine of 15 horse-power. Besides the current work of the arsenal, setting-up boilers sent out from Europe, fitting ships, &c., this shop has completed fourteen boilers, of four and five furnaces, intended for engines of 150 horse-power, with the necessary tubes.

The *Fitting shop* (*ajustage*) employs an engine of 30 horse-power. It can turn out machinery to the extent of 500 horse-power a year. It has actually turned out seven marine engines of 150 horse-power, and two others are in a forward state.

The *Setting-up shop* (*montage*) occupies a space of 950 square yards.

The *Foundry* (*fonderie*) has three smelting furnaces, capable of casting pieces of fifteen tons. It has turned out an average of twelve to fifteen tons of castings a week, such as cylinders, condensers, &c., for engines of 150 horse-power.

The *Chronometer shop* (*chronometrie*) is divided into three sections, one for the manufacture of chronometers, one for that of optical instruments, and a third for that of compasses.

The *Smithy* (*petites forges*) has forty-four forges and three steam-hammers.

The *Locksmith's shop* (*serrurerie*) occupies a space of about 600 square yards.

There are also a *Steam saw-mill*, a *Pattern shop*, and a *Joiner's shop*.

There are three *Building slips*, with sheds on both sides, and a large *mould loft*, in which the lines of ships can be traced the full size.

Masting sheers, able to lift weights of forty tons, and a *patent slip*, on Labat's system, complete the plant necessary for naval construction; the latter can haul up ships of over 300 feet length of keel, and 2,500 tons displacement. The ships on it are hauled up "broadside on."

In addition to the above, there are *Stores, Schools, and Quarters* for the staff of the establishment, both European and Chinese.

The total extent of the ground occupied by the arsenal is 117 acres.

There are three French schools—the *School of naval architecture*, the *Drawing school*, and the *Schools for apprentices*. There are also three English schools—the *Naval school*, in which mathematics and the theory of navigation, &c., are taught; the *Seamanship school*, on board the training-ship, *Kien-wei*, and the *Engineering school*.

In the latter schools, M. Giquel has had the assistance of some of our countrymen, Captain R. E. Tracey having been placed in charge of the training-ship, a post in which he has been succeeded by Captain P. P. Luxmoore, C.B.

The European staff consists of, at present, 52 persons. The native *employés* of this truly great establishment amount to 2,600 men.

During the astonishingly short time of seven years, M. Giquel has not only constructed an arsenal from its foundations, but he has actually built, and, in a great part, engined fifteen ships of war; one a corvette of 250 horse-power (450 I.H.P.). See accompanying list.

In a letter to me, dated August 29th, M. Giquel says:—"Instead of fifteen vessels, there are now eighteen launched; the three latter are similar to the one called *Foo-Po* [No. 4 in the list], and we have begun building composite vessels; two are at present under construction."

That M. Giquel has been able to do all this, in spite of the formidable difficulties in his way, is a remarkable proof of the energy and sagacity which he has brought to the direction of the important work he had undertaken. The very ground on which the arsenal is built had to be made. The soil of the site was alluvial, formed by a thick layer of solidified mud, covered with a coating of nearly liquid clay; a site about as unfavourable for a naval yard as could well be imagined. The freshets of the river obliged him to raise the level of the ground five feet above that of the original paddy field, on the unstable soil of which the works had to be established. He has succeeded wonderfully, and has not only placed the Chinese in possession of a valuable arsenal and a respectable squadron, but he has also taught many of them how to equip and manage the vessels which his ability has enabled them to construct.

List of Ships built at the Foo-chow Arsenal.

No.	Launched.	Name.	Class.	Displacement.	H.P.	I.H.P.	No. of guns.	Comple-
				Tons.				ment.
1	June 10, 1869	" Wan-Nien-Teing "	Transport	1,450	150	150	6	100
2	December 6, 1869	" Mei-Yünc "	Gunboat	515 ¹⁰⁰ / ₁₀₀	80	180	3	70
3	May 30, 1870	" Fou-Sing "	"	515 ¹⁰⁰ / ₁₀₀	80	180	3	70
4	December 22, 1870	" Foo-Po "	Transport	1,258 ¹⁰⁰ / ₁₀₀	150	150	5	100
5	June 18, 1871	" Ngan-Lan "	"	1,005 ¹⁰⁰ / ₁₀₀	150	150	5	100
6	November 28, 1871	" Tcheun-Hae "	Gun-vessel	572 ¹⁰⁰ / ₁₀₀	80	140	6	70
7	April 23, 1872	" Yang-on "	Corvette	1,398 ¹⁰⁰ / ₁₀₀	250	450	13	200
8	June 3, 1872	" Fei-Yünc "	Transport	1,258 ¹⁰⁰ / ₁₀₀	150	150	5	100
9	August 21, 1872	" Tsing-Yüan "	Gun-vessel	572 ¹⁰⁰ / ₁₀₀	80	140	6	70
10	December 11, 1872	" Tcheuen-Wei "	"	572 ¹⁰⁰ / ₁₀₀	80	140	6	70
11	January 2, 1873	" Tsi-Ngan "	Transport	1,258 ¹⁰⁰ / ₁₀₀	150	150	5	100
12	August 10, 1873	" Yong-Pao "	"	1,391 ¹⁰⁰ / ₁₀₀	150	150	3	100
13	November 8, 1873	" Hae-King "	"	1,391 ¹⁰⁰ / ₁₀₀	150	150	3	100
14	January 6, 1874	" Tchen-Hang "	"	1,391 ¹⁰⁰ / ₁₀₀	150	150	3	100
15	End of February, 1874 ..	" No. 15 "	"	1,391 ¹⁰⁰ / ₁₀₀	150	150	3	100

N.B.—Besides maintenance and repair of the training-ship and the steamers attached to the Arsenal.



OCCASIONAL PAPERS, NOTES,

AND

NOTICES OF BOOKS.

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This portion of the Number is reserved for Articles, either Original or Compiled, on Professional Subjects connected with Foreign Naval and Military matters; also for Notices of Professional Books, either Foreign or English.

It is requested that communications, or books for review, may be addressed to

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PRUSSIAN DRILL, 1876.

By Colonel E. NEWDIGATE, Commanding Rifle Depôt.*

A NEW edition of the regulation drill of the Prussian Infantry has been issued to the German Army. The great experience of this nation upon the field of battle, the immense amount of thought and study she has devoted to the art of war, and the high state of efficiency into which her troops are brought after a very short period of service, cannot fail to give importance to this work. In it we have embodied all the latest changes and orders upon the subject of drill which have been issued up to the 3rd of March, 1876.

The work still bears on its title-page the original date of the 25th of February, 1847, and from that time until 1870 no new edition was published. Numerous addenda had, however, been added from time to time, more especially in 1867, after the Austrian war and the introduction of the breech-loading rifle. The edition of 1870, dated the 3rd of August, was not issued to the army until a year later, when ample time had been taken to consider how far the changes it contained were in accordance with the experience of the battle-field. King William was at the head of his army at Mayence when he signed its introduction, and as the troops were already in the field, the delay in its issue can be easily explained. It was no time then to make alterations in drill. The effect would have been to unsettle those troops which had not practised the new formation, and the consequences might have been disastrous. As it was, however, the heavy losses in the earlier battles made it peremptory that some modifications in the old system of attack should be introduced even during the war. This old system was the attack by whole battalions formed either in line, three ranks deep, or in the attacking column, *i.e.*, a double column on the centre with skirmishers on the flanks. The losses which the Brigade of Guards and others suffered in these close formations caused the King to issue an order that company columns were to be employed. This formation had long been introduced into the drill book; but it was not until 1870 that it was established as the fighting formation for infantry.

In the following year (4th July, 1872), a cabinet order was issued from Berlin, calling upon General Officers to practise some further changes which were considered necessary on account of "the disproportionately heavy losses which had been shown by experience in the last war to result from the employment of closed battalions under fire in level and open ground; and, on the other hand, of the success which had attended a widely extended use of company columns and strong lines of skirmishers." In this order twelve points were comprised, all relative to the dispersed system of fighting,

upon which reports were to be furnished at the end of the drill season.

In the next spring, an order, dated 19th March, 1873, directed that the proposed additions should almost entirely be embodied in the drill regulations. There is, however, one point which should be noticed. It was proposed that "the supports" should be allowed "to follow the skirmishing line not only in line and in column, but also in extended order, with the groups (sections) either opened out or "closed;" but the *opening out of the supports* was not sanctioned in the order of 1873, neither has it been inserted in the present edition.

In the latter we have a few further alterations, but they come in here and there as additions. There has been no attempt to remodel the work; it still remains the drill book of 1847, with the modifications rendered necessary by the introduction of modern fire-arms. Much that has been considered unimportant has been struck out, and the whole comprises nine pages less than the last edition.

It is especially worthy of remark that the rapidity, strict dressing, discipline, and the perfect steadiness in the ranks for which the Prussian Army is proverbial, are now considered more necessary than ever. At the same time the training of the individual soldier requires even greater care, for each man must also thoroughly understand the art of skirmishing; he must be more self-dependent; and he must learn to think for himself, not only in extended but also in close order. The company now forms the important sub-unit for battle, and the men composing it must be able to drill equally well "whether the front or rear rank be in front, or however much the subdivisions or "sections of the company may be inverted." For all of this, individual intelligence is required, and the men are obliged to make use of their heads, instead of being mere machines, moved by word of command.

The present edition of the regulations is divided, as formerly, into five parts, and subdivided into chapters as follows:—

PART I.

Instruction of the Individual Infantry Soldier.

- Chapter 1. Instruction without rifle.
- " 2. Instruction with the rifle.
- " 3. Manipulation with the rifle for non-commissioned officers: carrying the colour, and the sword exercise for Officers.

PART II.

Upon the Squad and Company.

- Chapter 4. The squad.
- " 5. Formation, telling off, and dressing of a company.
- " 6. Manipulation of the rifle and firing of a company.
- " 7. Movements of a company.
- " 8. The company column and dispersed order of fighting.
- " 9. Formations for particular objects.

PART III.

The Battalion.

- Chapter 10. Formation in three ranks; dressing; manipulation of the rifle; firing, and movements of a battalion in line.
- „ 11. Formation of column from line.
- „ 12. Movements in column.
- „ 13. Formation of line from column.
- „ 14. Formation in two ranks (fighting formation.)
- „ 15. Squares.
- „ 16. The assembly.

PART IV.

Upon the fight of a battalion, with special reference to dispersed fighting, and the employment of company columns.

- Chapter 17. Instruction of the individual soldier, and of the troops in dispersed order. Conduct of the Officers and non-commissioned officers.
- „ 18. The fight of a battalion; the use of skirmishers, and company columns in general.

PART V.

The Brigade.

- Chapter 19. Rendezvous and development.
- „ 20. Movements of a deployed brigade.
- „ 21. Parades.
- „ 22. Colours and their honours.
- „ 23. Signals, marches, and instructions for drums and fifes.

In the following remarks we shall not attempt to enter into minute details as to the actual formations, positions of Officers, &c., &c., for in these matters there are *no changes*; but we shall endeavour to show what is the present system of tactics in force in the Prussian Army.

PARTS I AND II.

The first seven chapters remain almost as they were in the edition of 1847. In 1870 the instructions for countermarching were added to the company drill, and taken out of that of the battalion. This movement has now been struck out of the book altogether, because “it must be a matter of indifference to the troops, both at drill and in the field, which rank is in the front, and whether the right or left flank is at the head. The men must therefore be practised individually and collectively in divisions (*Abtheilungen*) in carrying out whatever movement may be ordered with the subdivisions “(*Züge*) in inverted order and out of their usual succession” (Section 34.)

The formation in three ranks is still retained; but for parade

purposes and route marching only. It has been the Prussian formation for years, and consequently all the reserves who have been through her ranks are familiar with it. Probably this may be a reason for retaining it. For parade purposes it has the advantage that the front of a company is one-third less than if it were in two ranks, but on the other hand Jäger Battalions are only formed in two ranks, and the additional width of front improves the appearance of their companies in marching past. For all fighting purposes the formation in three ranks is an obsolete formation. Formerly there was a meaning in the third rank: it was composed of the best shots and most adroit men. These formed the third subdivision, "*Zug*," of a company, called the skirmishing subdivision. In a battalion formed for battle these four *Züge* were placed under the command of a Captain selected for the purpose. In an "attacking column" (a term which has entirely disappeared from the drill book of 1876) the *Züge* were placed two on each flank; and when in line, two in rear of each flank. This system was altered in the book of 1870, when the skirmishing *Züge* were always formed in rear of their own companies, and they ceased to be placed under a Captain appointed for the purpose.

Now, however, all the subdivisions of a company have to act as skirmishers; the best shots are distributed equally among the companies (Section 15), and although as a rule the skirmishing *Zug* is first extended, it is a matter of no importance which of the three is so employed.

The transformation of a company of three ranks in line into a column of three subdivisions in two ranks is decidedly an intricate movement, and it is quite at variance with the principles of Prussian drill that the memory should be "clogged with a multiplicity of "formations;" but, at the same time, it is equally contrary to them to break down what already exists for the purpose of re-building entirely anew. The three rank formation is well known, and it is remarkable to see the rapidity with which a company, either advancing or retiring, suddenly breaks off and forms itself into a company column, and then remains perfectly steady. This in itself is a most useful practice for the men, because it accustoms them to find their places—a most important point in the "dispersed order of fighting," which we come to in Chapter 8.

The expression "*dispersed order*" must not be understood to refer only to the extended line of skirmishers which forms the front or firing line, but also to the breaking up into smaller bodies of all troops when in contact with the enemy. It is the subdivision of a battalion into four company columns, acting subject to the orders of the battalion commander as independent units, and the partition again of the companies into *Züge* and half-*Züge* and sections. It is the change which has been made from fighting with whole battalions, either in line or column, under command of one voice, to fighting in smaller fractions, each under its own chief, and each possessing, in proportion to its strength, a certain amount of independence of action. It is essentially the fighting system of the Prussian Army, and as the drill book is still retained in its old form, it is not surprising that we should

have to search in many parts of it for the additions which have been made relative to this subject. But the prominence given to company drill, and the important part which the company plays, are manifest from the large proportion of the drill book which is devoted to this subject, and the intimate connection which exists between skirmishing, dispersed order, and company columns, is the reason why we always find these three subjects treated together.

In preparing for action the companies are at once formed into company columns at quarter distance, viz., seven paces from front rank to front rank. If the subdivisions are 16 files in strength or more, they are divided into half subdivisions, but if less than 16, they are not to be divided. The formation takes place "out of step," i.e., the men move off at once and form up as quickly as they can, quite independently, but remain steady as soon as they are formed. All movements of the column also are made "out of step." For instance, the company may be ordered to form line on the leading subdivision (either to the right or left on one subdivision to the right, and the other to the left), when the men move off at once and form as rapidly as possible. In order, however, to preserve the rifles from injury, they are never carried at the "trail" except when skirmishing, but at the "slope," and always ordered at the halt.

The present regulations have made some important exceptions to the rule of marching "out of step." "Under the most effective rifle fire of the enemy, company columns are always to march in step. In the bayonet attack by these columns, the rules for the bayonet attack of a battalion are to hold good." Thus, when supports and reserves are being brought up to the line of skirmishers for the decisive charge upon a position, every portion, however small, must be brought up in close order and with the same regularity and precision that was formerly required of a battalion.

Again we find another exception: "It must be rigidly enforced that retiring movements immediately after an attack are always carried out in step (not at the double), and that on these occasions taut hold of the men is never lost."

These passages are most significant, and may be almost said to contain the essence of Prussian drill, the aim of which is to maintain strict discipline at the most critical moments, and to restore order as rapidly as possible after confusion. For this reason the greatest attention is paid to the steadiness of the men in the ranks. The perfect time, dressing, and carriage of the men in marching at attention, or "in step," is well known. When marching at the "shoulder" the arms are kept rigidly steady. At the "slope" the right arm is swung both by officers and men, and especially so when marching past a reviewing General. There is no half measure in this matter of swinging the arms any more than there is in any other part of their drill. They are swung with a will, and this movement is an assistance to the men both as regards time and dressing in marching.

Movements to be made "out of step" are preceded by the caution "*Ohne Tritt*." The men open out and march as is most comfortable to themselves, but with their rifles at the slope. The moment, however,

the order is given "in step," everything is done, even at sham fights and field days, with the regularity of the barrack square. The supports, for instance, if under fire, are moved, halted, or fronted, and arms ordered by word of command with the utmost precision. The object seems to be to transfer to the dispersed order of fighting as much as possible of that command over the men which close order affords.

But it must not be supposed that this produces either slowness of action or inflexibility of movement. The reverse is the case. Nothing can be more flexible or handy than the company column. It can send out skirmishers just in the strength required; it can re-inforce them when needed; it can form one general and intermixed firing line and reform in company column with the greatest rapidity. Bayonet attacks are made by the company, or by the small detachments of it which are scattered as supports in rear of the skirmishers. In fact, every duty which formerly belonged to whole battalions is now the rôle of the companies.

But it is the last paragraph of the quotation which deserves special notice: retiring movements must not be made at the double, the men, on the contrary, must march in step, and must be kept tightly in hand. The expression "retiring movements" is worthy of notice; it does not necessarily follow that the attack has failed—a contingency that should never enter the heads of the men making it. But from whatever cause a retreat may be necessary, it is of the utmost importance that the greatest regularity should be observed. If once the men were allowed to double when exposed to fire it would be almost impossible to stop them, and the more the firing line had been previously reinforced by supports and reserves, the more hopeless would be the confusion, and the greater the risk of disaster. This short paragraph speaks with an eloquence which cannot be overrated; for it touches the weak point in the dispersed order of fighting.

So long as the fighting line is successful and re-inforcements are at hand to be thrown into it whenever required, all goes well; but when these have been used up and ammunition, perhaps, is also running short, then danger arises. At the commencement there are plenty of reserves. Every battalion has its two companies and every brigade (6 battalions) has either two or three battalions, forming a second line of battalions called the "third *Treffen*;" but in an obstinate fight these are soon dissolved, and only a very small portion of each battalion is perhaps left. To keep back the third *Treffen* as a reserve in the event of defeat would be contrary to the principle that you should make your attack as strong as possible; and the feeling that there was a force in rear to fall back upon might lead the first line into giving up too soon; whereas, if a sufficient re-inforcement had been sent into it victory would very probably have been the result. At all events, it would have been the best chance of securing it. We should here mention that the old rule that "the skirmishers are to fall back" upon the battalion when they can no longer offer resistance to the "enemy" has been struck out of the regulations; it belongs to an obsolete system. But to return: the attack, in spite of everything,

may fail, and then the difficulty of drawing back in an orderly manner would be very great. This difficulty is increased by the intermixing of men belonging to different subdivisions, companies, and battalions. It cannot be prevented altogether, but the regulations lay down that it should be avoided as far as possible; and that in re-inforcing the skirmishers, groups (sections) should be pushed up into the intervals between the firing groups, and not files between files. This is another advantage in skirmishing by sections, with intervals kept between them. It also applies equally to the half-subdivisions which first extend in front of a battalion. There is no reason why considerable intervals should not be left between these to be filled up later on by the other half-subdivisions which form the first re-inforcements. Everything must be fostered that tends to keep the men in hand, yet it is only by the constant practice of an orderly retirement—drawing back portions of the line by degrees, leaving only a few skirmishers to cover the movement, whilst the remainder move steadily to the rear and re-unite as quickly as possible in their different sections and subdivisions—that the danger of this weak point can be lessened.

The regulations for extending, for the movements, re-inforcement, and firing of a line of skirmishers, remain almost unchanged. A certain number of simple rules are given without entering into detail, as for instance:—

A half-subdivision only is to be extended in the first instance (this used to be a section only).

The files make a half-turn and move by the shortest way to take up the ground they are to occupy, or until halted.

It is a matter of no importance whether they remain one in front of the other or side by side.

An interval of a few paces is to be left between the sections in order to give the non-commissioned officers greater control over the firing of their groups.

In quite open ground the files must not open out more than six paces.

When moving, skirmishers carry their rifles at the trail, or for the sake of change, under the right or left arm like a sportsman.

Strict injunctions are given for the superintendence of the Officers at the firing.

Should it be necessary to fire during movements, the actual men must be named for this purpose.

“In rapid firing, in order to maintain strict *fire-discipline*, and to avoid the useless expenditure of ammunition—so disadvantageous in its consequences—it is well always to order the number of cartridges that are to be expended.”

When closed re-inforcements are sent into the firing line they usually fire volleys, and volley firing must not be allowed to degenerate into rapid firing or independent firing.

It has been proved by target practice in the Prussian Army that the percentage of hits made by a squad firing volleys by word of command, is greater than that made by independent firing, even in extended order, and the better the volley the greater is the percentage of

hits. The reason given for this is that the word of command tends to calm the men, which is all-important in firing. A writer in the *Militair Wochenblatt* considers the habit of volley firing so essential in the present day, that he recommends its being practised, even for a few minutes only, on every occasion when the men parade with arms; that it should be repeated two or three times every day, and that the word of command should be given by different Officers or non-commissioned officers, with the view of accustoming the men to take orders from others than those to whom they are accustomed. In the last war, it is true that volley firing was seldom used, and when it was it always degenerated into independent firing; but this, he argues, is only a proof of the want of fire discipline and of the necessity of paying much greater attention to it in future.

With regard to the instructions as to the conduct of the skirmishers when attacked by cavalry, the regulations first describe how they may make use of the nearest cover, or form clusters round their leaders, or unite with the nearest supports. A new rule has now been added that "in many cases it will be advisable to leave the "skirmishers in their position, especially if it affords any cover"—and the next chapter, which describes how a company column is to form square, commences with the remark that "against a cavalry "attack it is not always necessary to form a company square, but "should circumstances render it necessary, &c." And again, in Section 102, "upon the movement of the skirmishing line," there is another new passage to the same effect: "When attacked by cavalry "the skirmishers must especially depend upon the efficacy of their "fire, and it is therefore recommended in many cases that they should "remain in their positions, particularly when the ground affords some "cover." This principle that men must not as a matter of course run into close masses and form targets for the rifles and guns of the enemy on the appearance of a body of horsemen, was laid down in the order of March, 1873, and now for the first time is incorporated in the drill book. It is experience gained in war and speaks for itself. On the other hand, close formations will sometimes be necessary to resist a heavy charge, and instructions are given for firing upon cavalry in four ranks. This mode of firing is also sometimes used when the supporting Züge are brought up to the skirmishers in order to pour in the greatest weight of fire immediately before a final assault.

Great stress is laid upon the value of volley firing at this moment, which consists "not so much in the number of volleys, but in the calmness and coolness with which they are delivered." The closed detachments which are placed at intervals along the line in rear of the skirmishers must be practised in leading while moving. The bayonet attack may be carried out either in line or column, and after it has succeeded these closed detachments are to fire volleys.

This part of the book winds up with repeating the injunction that "Companies must be able to execute the simple formations and movements which are necessary for fighting under all circumstances, by "day as well as by night, either rank in front, in inverted order, &c. "They must be able to deploy on the leading subdivision with the

"greatest rapidity and certainty, not only in close order but also in extended order, and towards either side—to the right or left, or simultaneously to both sides." And again "they must be able just as quickly to re-assume a formation suitable for some other phase of the combat. The training of a company must in short be such that the captain has it always in hand, and so fully attentive to his orders, as to be capable even of executing what has not been specially practised beforehand."

PART III.

The Battalion.

Although so large a proportion of the drill book is devoted to instructions relating to company columns, the battalion is considered, as it has ever been, the principal unit for combat. This unit has to be subdivided into smaller sub-units, each acting with a certain amount of independence, but still remaining under the single guidance of the battalion commander. In 1866, when company columns were first used in action, the great disadvantage of their getting out of the hand of the battalion commander was experienced. Since then, the new regulations which have been issued all aim at preventing this evil in future. It is probable that the authorities had also this point in view, when they added the following paragraph to Section 91. "When the company columns of a battalion are formed in one *Treffen* (line of columns) at the deploying intervals of a battalion only, the battalion commander is to give the word of command for carrying out evolutions common to all—such as manual exercises, &c. —in the same way as with a closed battalion. When the company columns are not formed in one *Treffen*, or have a wider extension of front than the above, the captain takes up the word of command from the battalion commander."

The movements of a battalion formed in three ranks have not been changed, but their number has been considerably reduced. Of those that remain, some are not to be made the object of an inspection; they are not applicable for fighting purposes, and must not be regarded as a test of the efficiency of the battalion.

In Chapter 10 we have the formation in three ranks; dressing; advancing in line; retiring in line; diagonal march; passing obstacles and changing front. The latter is comprised in four lines: "The divisions are marched off and reformed in the new dressing line, unless it be desirable to form close column, or column on the centre." Until 1870 a line changing front on the centre (the colour) was one of the line movements. In 1867 a note was added that "this can be practised on the drill ground as a peace-exercise, because it helps to promote the adroitness of the Zug-leaders and men. It must never be made the object of an inspection." In 1870 it was struck out of the book altogether.

Chapter 11 gives the different modes of forming column from line. Forming column in front of a named division has been struck out, and

the formation of a column left in front is not to be a test of efficiency at inspections.

Chapter 12 contains the movements in column. These consist of marching in files, in sections, in half subdivisions, and in subdivisions; changing direction in open column; reducing and increasing the front of divisions in open column; marching in close column; wheeling, and the diagonal march; opening and closing a column; forming column on the centre from open or close column of divisions (Züge), and reforming open or close column from a column on the centre. Neither of the two last movements, nor the marching in file, is to be made use of at inspections.

Chapter 13, on the formation of line from column, consists of deployments to the right or left and to both flanks simultaneously; and deployment from column on the centre. The deployment to the right is forbidden at inspections.

This ends the movements of a battalion in three ranks, and they are, as before observed, only such as are required for a march past or for route marching.

Chapter 14, on "the formation of two ranks (fighting formation)" commences with a new section (77). It is a fundamental rule that when a battalion in three ranks has to take up a fighting formation this is to be done by forming company columns.

The change from a fighting formation into a three rank formation is made on the order from the battalion commander "Three ranks—form!" by the skirmishing subdivisions forming up in the shortest way as a third rank.

In forming these company columns from line, the companies on the right of the colour form columns of subdivisions (or half-subdivisions) to the left, those on the left of the colour form columns to the right. The colour and escort remain with No. 3 company, and move as a section in rear of the 3rd subdivision. Bandsmen join their companies.

So long as the two centre companies remain together, the senior captain of the two commands them, unless there is a second Staff Officer with the battalion.

The double column in rear of the two centre companies (column on the centre) is the established rendezvous formation of a battalion "because it facilitates the battalion commander's supervision of his "troops, and from it any fighting formation can easily be taken up."

When the company columns of a battalion are opened out from one another, the battalion commander names a company upon which this formation is to be made, and the others move up by the shortest way.

The movements of a battalion in two ranks are made the same as when in three, and the skirmishing subdivisions remain as in the former edition, in rear of their respective companies. Under the heads of "The attack with the column" (Section 84) and "The bayonet attack with a deployed battalion" (Section 88), we find hardly any alteration since 1867. This certainly appears rather inconsistent with the positive orders against employing whole battalions

under the effective fire of the enemy; but the object of retaining them is no doubt for the guidance of the companies and subdivisions sent forward for the final charge, and which are directed to carry it out in the manner laid down for a battalion. The instructions run as follows: "Upon the order, *For attack, rifles on the right!* the battalion bring the rifles to the right side and break into a quickened pace, which is indicated by the beating of the drums without the fifes playing. . . . At a short distance from the enemy (about 12 paces) the order is given *Charge rifles!—Double!* upon which the front subdivisions of the battalion bring the rifles to the charge, and the men rush upon the enemy with a loud hurrah! . . ."

In the dispersed order of fighting such a thing as a battalion attack can hardly be expected to occur. But the bayonet attack carried out simultaneously by all the closed troops behind a long firing line, with all the drums beating the storm step, the dispersed bodies converging as they advance upon some special point—a previously arranged flank attack developing itself at the same time, and then the final rush and hurrahs of the whole, is, to use the mildest term, *most imposing*.

In the formation of the skirmishing line, great liberty of action is left to the battalion commander, who can employ whatever companies or subdivisions may be most suitable, but the rule given in Section 87 is first to send out half of the "skirmishing subdivisions" of the flank companies. These extend in front of the battalion, but are not allowed to open out more than six paces. The other halves follow to re-inforce the skirmishers when necessary. The remaining subdivisions of these companies follow in column as supports; and the two centre companies form the reserve. This is considered the *normal* formation when several battalions are working together, and the distances which, however, "may be increased according to the objects of the exercise," are given in Section 111 as follows: From skirmishers to re-inforcement 100 paces, to supports 150 paces, and to reserve or main body 150 paces, making a total of about 400 paces. This is dispersed order, but we cannot help observing that in this part of the book much of the obsolete system appears to be retained. Thus the two reserve companies, which are now specially termed the *Haupttreffen* are called the *Battalion*; and the skirmishers are to be guided in the direction of their march by the movements of the battalion. There are also instructions for clearing the front at the double, and forming up in rear of the flanks, which are quite inconsistent with the new order of things. But after a few pages we come to another Section (91) upon company columns, which begins with a new paragraph as follows: "The fundamental fighting formation of infantry is the battalion formed in company columns. It is therefore a rule that when a battalion prepares for fighting it must take this formation."

No fixed rules can be laid down for all occasions, either as to the number of companies to be sent forward or the intervals between the companies. The battalion commander must adapt his dispositions to the circumstances of the case and the end he has in view. As a rule, greater depth than width should be given to the formation; companies

must never be opened out so far apart as to be unable to support one another. The gradual development of the force must be considered; and one company at least must always be kept in reserve. "The battalion colour remains with the company in reserve, and in case this should exceptionally be dissolved, the first Zug of this company must, under all circumstances, remain with it."

Chapter 15 is upon "squares." This subject has already been referred to. That it is not considered necessary always to form square is evident from the new sentence with which it commences. "Should a battalion in two ranks have to defend itself against a cavalry attack by forming square, it will, &c."

Chapter 16, upon "the assembly," concludes this Part. The only alteration here is that the men always assemble in *two* ranks instead of in *three*.

PART IV.

"The mode of fighting of a Battalion, with especial reference to dispersed order and the use of Company columns."

In former editions the heading of this Part had special reference to the *vocation of the third rank*. Now it has reference to the *dispersed order of fighting*.

Chapter 17 contains "The instruction of the individual men and of the troops in dispersed order, and the conduct of the Officers and non-commissioned officers." Although there is not much that is new, the practical remarks are excellent:

Skirmishers must possess power of judgment, skill, boldness, activity, and self-confidence. In the use of their rifles they must be thoroughly expert. It is the special task of all Officers to cultivate these qualities among the men.

Skirmishers must move with freedom and without constraint; such matters as careful dressing, position, manner of carrying the rifle, number of paces between files, and such like, should never be mentioned.

They must be taught how to avail themselves of cover, and how a very slight wave in the ground will screen them from the enemy's fire. In order to teach this, squads should be opposed to one another.

No greater number of men should be extended than is rendered necessary either by the formation of the ground or by the strength of the enemy.

No firing to be allowed on single men at a greater distance than 250 meters, nor on larger objects, such as columns, artillery, &c., than 500 meters.

Long lines of skirmishers must have a few men sent out on the flank or a detachment echelloned towards the rear in order to cover the flank, unless it is protected by other troops or natural obstacles. Great attention is called to this point; and the files sent out on the flank are not only useful in preventing surprise, searching small covers, &c., but also in keeping up the connection between different bodies of troops.

As a general rule movements must be made at a brisk pace, but without doubling. The regulations say that "it is only on rare occasions that an exception to the rule is permitted," but it is under the head of these exceptions that one of the most important changes in the mode of advancing under a heavy fire is introduced, viz., *the advance by rushes*. After referring to the different occasions when it is proper to double, such as crossing a flat open space swept by the enemy's fire or driving the enemy from a position by a front attack when it is impossible to surround him on the flanks, and a rapid onslaught has to be made by the skirmishers, re-inforced to the utmost. The book goes on to describe "the advance by rushes" in the following manner:

"Under certain circumstances, and with due regard to the ground, it may sometimes be advantageous to execute the attack by making the skirmishers run rapidly over a tract of ground (60 to 80 paces) and throw themselves down in order to fire; then, after a short pause, to continue the advance in the same manner. The attacking movement may, however, be prolonged by such an advance, and, as it expends a great deal of strength, it must not be commenced, at the soonest, at a greater distance from the enemy than 500 paces."

This was ordered to be practised and reported on in the cabinet order of 12th July, 1872. It was included in the order dated 24th of March, 1873, and now for the first time is embodied in the drill book. The only points of difference in the three orders is the space to be crossed; the first says 50 to 80 paces, the second 50 to 60 metres, and the final order fixes it at 60 to 80 paces, and also forbids the advance in this manner at a greater distance than 500 paces from the enemy. These are matters of detail which no doubt had been deeply considered before definite conclusions were arrived at, and they are of great importance. It is the opinion held by many that the only way of advancing over that most dangerous zone—from 600 to 200 yards from the enemy—is by rushes, or at all events that this is the best means of reducing the losses; and for these reasons it should not be an occasional mode of advancing, but one that is constantly practised, and to which the men become thoroughly habituated. This is the only way of overcoming the objection that if once you allow the men to lie down you will not get them easily to make another advance; and it is likely that this objection carried weight when the decision was made that the space crossed in each successive rush should be as great as possible without distressing the men too much.

At 200 yards or less the supports are brought into the firing line. Soon after this the order is given to attack, and the drums beat the storm step. Finally "the whole—skirmishers and closed groups—run straight to the front as arrive in a loose line upon the enemy, or else converge as they advance upon one or more points in the enemy's position previously indicated by the leader. In the latter case they run through the enemy's fire in loose order, and unite in more or less closed divisions (but always under the immediate command of their leader) in the enemy's line in order to roll him up or to oppose his supports."

As soon as skirmishers are no longer required, or are only needed in small numbers, they must be recalled. In the event of their being driven back they must at once rejoin their companies or battalions.

With regard to the conduct of the Officers and non-commissioned officers, they must thoroughly understand skirmishing on account of "the often decisive share that skirmishers in the present day have in every fight." They must acquire aptness in dealing at once with circumstances as they present themselves.

They must strive never to let their divisions get out of hand, and they must *lead their fire*. They must indicate the distances and aim. They must take care that the men are sparing of their ammunition on the one hand, and on the other they must point out *the moments and objects which justify an increased expenditure of cartridges*.

All leaders of skirmishers must consider how they can get the shooting line, or a portion of it, nearer to the enemy. How they can surround him or make a flank attack; how they can take advantage of any mistake on his part, and so on.

It is only when there is danger in delay that re-inforcements must be sent by the shortest way into the firing line. At other times it must be considered how and where this can be done, with a promise of the best results, without intermixing the divisions, or interfering with their mutual connection by bringing them through one another.

Chapter 18 is on "The fight of a battalion, and the use of skirmishers and company columns in general."

The introduction draws attention to the "offensive character" of a *concentration of the fire* for short moments upon single points; the *independently decisive* results which sometimes are produced by this, and the assistance which, under any circumstances, it renders to the attack which follows. Also to the importance of supporting the loose first line, when obliged to act on the defensive, especially as experience proves that the greatest losses always occur whilst retreating. It further says that in most cases there is very little use in occupying advanced points merely for a passing defence. It is far preferable as a rule to bring the forces which are to be employed in a defensive position into action in *one and the same line*, although by degrees.

"Infantry well instructed in firing can repulse by their fire every *attack in front*. . . . The conviction must be roused and fostered in "the men that they are unassailable in front and that it is only when "they turn their backs that they have anything to apprehend."

Great importance is given to the protection of the flanks, and the further back the different supports of the first line are kept, the better will this object be attained.

As to the position and employment of skirmishers, no rules can be laid down applicable to all occasions. "The effect would only be to "paralyse the mind of the leader," there is, however, one *fundamental principle* insisted on "*that the skirmishers are always supported by 'the companies to which they belong.'*" This is one of the advantages of the strong companies of the Prussian Army. They are fit for independent action, and the only rules laid down are that when detached for any special purpose their skirmishers must go with them.

and skirmishers are not to be employed without being supported by their own companies.

The employment of battalion columns under fire, however, is forbidden. The normal formation must be in company column. The instructions contained here, and the illustrations given in the following section, are only applicable to the simplest phases of fighting, and only intended to show how troops are to be *instructed* in fighting.

Thus: in attacking, the object must be first to strive to get the firing line as efficaciously near to the enemy as possible in order to subdue his fire.

In the advance by rushes the supports also advance in this way, but the companies which form the reserve or third Treffen advance in the usual manner—not by rushes.

When a position has to be taken, or some special point gained, a sufficiently strong force must always be employed, as a failure is injurious to the *morale* of the troops, and only leads to useless losses.

The leaders of the skirmishing line—and this is now the place for the captains—must always be on the look-out for the best means of making themselves masters of the next section of ground, and act upon their own responsibility as soon as they are actually engaged.

Should the enemy appear to be shaken in any part of his position, the nearest supports must be brought up, and a concentrated attack made upon this point. As the troops draw together, the Officers must get them in hand again as quickly as possible to resist a counter attack. The divisions farther back must take the opportunity of gaining ground, whilst the enemy's attention is taken up with the attack, in order to oppose, either by volley firing or a bayonet attack, the reserves which he may be sending up in force.

Advice is given as to the selection of a defensive position. Shelter trenches may here be used with advantage, but they must be limited to affording cover for men lying down, and must on no account impede the advance later on. In the German Army several shovels for this purpose are carried by the men.

The increased efficacy of the fire gives great strength to the front of infantry, and points to the *attack on the flank* as the weakest point. The deep formation recommended affords protection in the defence, and the closed divisions kept back are available for being moved round in a circuit against the enemy's flank “who will easily be induced to “slacken his resistance on the firing becoming audible on his flank or “quite in his rear.”

All closed divisions now act almost entirely as reserves. Their office is to foster the skirmishers' fight, and they must often adhere closely to their movements. (We cannot quite understand why, in an early chapter, the skirmishers were directed to guide their advance by the battalion in rear?). It is most essential that the leaders of these closed bodies of men, of all ranks, should pay great attention to the mutual connection of the skirmishing line with its own supports and reserves, in order to guard against the intermixing of the different parts of the troops; and when obliged to support one body of troops with another this must be done if possible by sending them up on the side and not by intermingling them.

The next section is again "*on Company Columns.*"

The intensity of fire renders dispersed order necessary, but the partition of a battalion into smaller divisions than is actually necessary is strongly deprecated. Superior Officers must constantly *guard against letting their troops get out of hand*; and all subordinates, the *company leaders* in particular, must *rejoin their battalions quickly* after having accomplished their task. On the other hand the dexterous and independent leadership of the company Officers must be brought into play as much as possible.

Although it is again repeated that fixed forms for all the different modes of development in company columns cannot be laid down, some formations are given applicable in large combinations of several battalions at the same time.

The normal formation has already been given in our remarks upon chapter 14, but it is here that the terms "*Vortreffen*" and "*Haupttreffen*," are first introduced. The former is composed of the two companies (usually the flank companies) which are first sent forward to form the line of skirmishers and their supports. The "*Haupttreffen*" consists of the two centre companies which remain behind at first, held together as a half battalion and acting as the reserve.

It is a formation which can easily be taken up, either from the line of march, or from any formation in which the battalion may be; and on account of its depth is suitable either for attack or defence. The two companies in front can develop a strong firing line, and in this formation a crisis may be brought about by a bayonet attack, either by the two front companies alone with the supports coming up to the skirmishing line; or by the companies in reserve coming up and joining those in front; or these two latter companies may be directed against the flank and endeavour to surround the enemy.

Another advantage of company columns mentioned here is the facility with which they can take advantage of the ground for cover, as compared with a whole battalion; the smallest inequality of ground affords them cover, and even without this they offer but a small object of aim.

They can rapidly take up any formation that is required, and another point which is always insisted on is the facility with which a Commanding Officer can get his troops again in hand and re-establish the internal steadiness which may have begun to waver.

When a battalion is fighting alone, the company column system is suitable for carrying out the established principle in fighting: *never employ more forces than are necessary*. Some illustrations are then given of a battalion acting alone.

The fight begins with one company, of which half a subdivision only, or at most one subdivision, is extended. As soon as it has been ascertained where the enemy can best be attacked, or on what point he is going to make his attack, another company can be sent up to that side to prolong the line of the first company. We must here draw attention to the fact that the line is not to be prolonged by a subdivision of the first company, because this would deprive the skirmishers of a portion of *their own supports*, but another company

complete is sent up, thus carrying out the rule that skirmishers must always be supported by their own companies.

Later on it may be necessary to prolong the line still more, either on the same or on the opposite side, when a third company, with its skirmishers and supports, is sent forward.

Should the enemy now be shaken by the fire, or should any favourable point have been gained for a more severe attack, the fourth company can still be brought up in order to bring about a crisis. In the defence, however, when there are no other reserves present, this last company must be kept back as long as possible, for the purpose of making a counter attack, should the enemy attempt to bring about a decision.

Again, if a battalion is marching alone in the vicinity of the enemy, one company should be sent forward to act as an advanced guard, and this company should be preceded by skirmishers. Or if a battalion is moving prepared for action, when there are no other troops between it and the enemy, it must be preceded by scouts sufficiently far in front to prevent its coming unexpectedly under an effective fire. Should the skirmishers succeed in turning back the foe and gaining a position, the battalion must at once establish itself there. For this purpose the closed detachments must be at hand. It is in order to insure having these closed detachments in readiness, that so much stress is laid upon keeping the different sections of troops as intact as possible; also that all men who are not actually required in the firing line are at once to be recalled; and again that no more men should be extended than are absolutely needed on each separate occasion.

When a retreat becomes necessary, it is important that a portion of the battalion should be sent back to some point or ordered to take up a position, previously indicated, in readiness for the reception of the remainder; but on no account must any of them be sent back for the reception of defeated troops before a retreat has even been decided on.

The troops falling back should, if possible, retire on the flank of those formed up to receive them, and the position to be taken up by the latter should be selected with this view. When the enemy's cavalry are in the neighbourhood during a retreat, the skirmishers must not be left too far behind the other troops.

This part concludes by saying that, in the barrack square, the instruction of soldiers should be in all the formations for fighting, with the various phases they take in different kinds of ground, irrespective of the level nature of the parade ground. The correct employment of these various phases in accordance with the formation of the ground must be taught in the country. On the parade ground, skill in executing formations and evolutions; mutual understanding between the troops that are side by side and in rear of each other; cohesion and strict discipline can alone be taught and learnt. But this does not depend on a multiplicity of intricate manœuvres. A few simple forms, such as those previously given, are amply sufficient for fighting purposes.

"It is, however, unconditionally necessary that every battalion " should be able to execute these with regularity and certainty under

"the most unfavourable circumstances—in bad ground, in the dark, "in inverted order, rear rank in front, &c."

And finally, neither the fatigues of long field days nor the privations of war must on any account cause the influence of the Commander over his troops, or their attention to his orders, to be lessened.

PART V.

The Brigade.

Chapter 19. "*Rendezvous and Development.*" A brigade is composed of six battalions, usually of two regiments of three battalions each. But the rules for a brigade hold good, however small a number of battalions may be collected together. If there are more than two they must be formed in two "*Treffen.*" We have no word which corresponds with this term, but it is used to express the bodies of troops which form the different lines.

The usual formation is to place the battalions of the junior regiment in the 1st *Treffen*, and those of the senior in the 2nd *Treffen*. Each *Treffen* is then commanded by the Colonel of its regiment.

When field evolutions are about to take place the battalions are formed in "column on the centre." Previous to a march they are formed in "close columns of subdivisions."

For evolutions a brigade is formed in three *Treffen*. That is, one battalion is placed in front as an advanced guard, or else one is moved back as a reserve. The distance between the different *Treffen* is 30 paces.

The *development* of a brigade consists in opening out to deploying intervals with 20 paces between the battalions, and gaining the full *Treffen* distance on the march. The latter must depend upon the circumstances of the fight, and must therefore be decided by the Brigade Commander. When no distance is specified, 400 paces must be considered as full *Treffen* distance. To economise space, however, on the drill ground, this may be reduced to 150 paces.

Chapter 20. "*Movements of a developed Brigade.*" The battalions are all in company columns. Those of the first *Treffen* advance in the formation already described with a *Vortreffen* and *Haupttreffen*. A battalion of direction must be named.

Great liberty of action is, however, left with the Brigade Commander, both as to the employment of the different battalions, and also in the position of the regiments. Instead of having the battalions of one regiment in the first *Treffen*, and those of the other in the second, he may place the regiments side by side, each having two battalions in the first *Treffen* and one in the second.

This arrangement has many advantages; it gives each regiment a deep formation, and prevents to a great extent the intermixing of the two regiments in action.

The attack of a brigade is only carrying out on a larger scale what has been already remarked upon, with the addition of instructions about the employment of the 2nd *Treffen*.

One battalion must be kept in reserve under the immediate orders of the Brigade Commander.

When advancing with one battalion as an advanced guard, this battalion commences the fight, but it must not extend its front too much. The prolongation of the front must be carried out by sending up battalions on the side of the one engaged, precisely upon the same principle as was illustrated by the fight of a battalion in company columns.

In *changing the front* of a brigade the battalions as a rule form columns. There are very few words said about this; the battalion on the turning point wheels into the new direction, the others move into the new alignment thus indicated, one after another, by the shortest way, and take up the dressing.

As a rule, changes of front are to be made "out of step, but in perfect order."

The change of front will, in most cases, be only slight, and wheeling a quarter-circle at full interval is forbidden. Should it be necessary to show a fighting front towards a flank, the nearest battalions must be employed, which will at once form a line of skirmishers with supports (a *Vortreffen*).

A slight change of front can also be made by advancing one wing and wheeling the battalion, which would then be in a short echelon formation.

The general observations which conclude this chapter again repeat the remark that the formations given are only examples of the most simple nature, and when employed it may be found that they require frequent modifications. "The attention of Brigade Commanders must never be diverted from the essential by retaining appointed forms." An example is then given of the employment of regiments by wings (*i.e.*, side by side), which is full of useful instruction.

The whole book, indeed, is full of valuable advice, which, being compiled from practical experience, must be beneficial to all students of the art of fighting; and yet throughout it is the *spirit* rather than the *letter* of the instructions that is insisted on.

As, however, our object has been merely to lay before our readers the present system of fighting in the Prussian Army, we shall now bring our article to a close. We must not, however, omit the concluding paragraph of this chapter, which has been added in the present edition. It is to the effect "That those in command over the different divisions of troops having to change about, it becomes essential for the due comprehension of their orders that the manner and wording of these should be similar under all circumstances. It is therefore laid down that no words of command or signals excepting those in the regulations are to be used by Commanders of troops. For the same reason, all laying down of rules or fancies (*Schematisirung*) is strictly forbidden, as tending to limit the free-play allowed by the regulations. No superior Officer may therefore issue written orders or explanations of the regulations.

"Above all, in order to insure that precise unity of action in the troops, which is so absolutely necessary for any special objects of the drill-ground or the field, a verbal order from the Commanding Officer, suitable to the case in question, must in all cases suffice."

THE GERMAN RAILWAY REGIMENT.

By Lieutenant H. E. RAWSON, R.E.

At a time when the question of the purchase of the whole system of railways throughout Germany by the State is being eagerly discussed by the Federal States, and Prussia has set the example in the matter by voting on the 2nd of May last, by a substantial majority in the Chamber of Deputies, the law ceding its railways to the Empire, there is a peculiar interest attaching to the organization which would be adopted by it for their management, and which is very clearly indicated by that which already exists in the **PRUSSIAN RAILWAY REGIMENT.**

It is for want of such a complete system, that the Italian Government, upon concluding the purchase of the South Austrian and Alta Italia railways on June 27th ultimo, has been obliged to stipulate that a private company should carry on the administration for the next two years, though as early as June, 1875, it had ordered that all Officers of the Army should go through a course of instruction in the technicalities of railway management. Quite three years must elapse before the vote of May 2nd can be carried through the Reichstag, and the Prussian railways finally handed over to the Empire, when the expanded organization of the regiment will be quite sufficient to meet the demands made upon it. Such a powerful branch of a military system commanding the respect of the whole world, needs no argument from the writer, to show the value of the subject touched upon in these pages, nor to assure its place among the three recognized arms of warfare, infantry, artillery, and cavalry, for to deny its right to be among them, is to shut one's eyes to the times.

The Prussians were the first nation to recognize, in a practical manner, the fact that the day had gone by in which it was possible for a general in command to conduct, simultaneously, the organization of the services required in maintaining the communications, as well as the military operations of the army. Wellington did it, Napoleon did it; but neither Wellington nor Napoleon had to deal with the question in the aspect it has assumed to-day, complicated as it is by the increased number of men to be provided for, the greater rapidity required in all movements, the more extensive scale on which military operations can be carried out by railways, and the larger area of country over which they are conducted. In the Peninsular war, convalescents, assisted by detachments from the main army, and organized by the General in command, were able, under the charge of the officer commanding the Corps of Guides, to ensure the lines of communication; but this was for an army seldom exceeding 40,000 men. The army sent into the field by Germany amounted to between 400,000

and 500,000 men, and to effect the concentration of this enormous force, required the transport of no less than 42,000 men daily to the frontier. It was completed in thirteen days after mobilization. In Jacquin's words¹, "on the 24th or 25th of July the railways were "closed to passengers and goods. Eleven days afterwards the concentration of the whole of the GERMANY army upon the western frontier "was terminated; two days later, the army was victorious at Forbach "and Frœschwiller. . . . FRANCE appeared ready the day war was "declared. Ordinary traffic on the railways was suspended on the 16th; "trains followed trains in rapid succession, and ten days later, 186,000 "men and 32,000 horses were disposed along the frontier." It is not to our purpose, to follow him in the picture he draws of the two armies at that time, except so far as is contained in the following sentence. "While France was in every respect in disorder and confusion, while "in Metz the Intendance Department was searching for its provisions, "the Corps for their kits, the Artillery for its ammunition, regularity "and order pervaded the whole of the operations of the German army." Prussia had recognized the important part railways had played in the American Civil War, had studied the successful application of organized bodies of workmen, civilians it is true, but bowing for the time to the severest military discipline, to the construction of railway works requiring rapid execution, to the destruction, and to the restoration of lines; had made trial of such a method for itself in the campaign of 1866, and had found that properly systematized, a new and most powerful arm might be developed. As the result of its experience, the army entered upon the campaign of 1870 with four Railway corps, subsequently increased to seven, for the three main lines of communication. They were but bodies of civilians and military intermingled; hastily associated, and provided with material for such operations as they were intended to carry out. They amounted in all to 800 men at the commencement, to 1,400 men at a later period of the war. But there was a method in their organization, there was order and precision in the way they were employed, and above all they formed a link in a chain which Prussia had long forged, had tested in 1866, and had pronounced sound and strong in the principles upon which it had been constructed. A system of ROUTE SERVICE (Etappen-wesen) which organized a special body to preserve the *lines of communication*, had been approved before the contest with Austria commenced, had been improved by the experience obtained, and was now put into practice against an enemy, who had not got as far as its own condition in 1866, and who was destined to give a proof in acknowledgment of its past blindness, by creating a Railway corps during the war. It succeeded in collecting a vast store of material in Metz and Strasbourg, only in time to fall with these places into the hands of the Germans. The results of the war of 1870-71 left Prussia in no wise content with what it had done; and it has pressed onwards with such vigour, in its attention to the organization of a military body capable of taking over the complete management of

¹ "Les Chemins de Fer pendant la Guerre, 1870-71." By M. Jacquin, Paris, 1872.

such lines of railway as may be employed, that whereas in 1870 it had not a man who had not to be specially mobilized for the Railway corps, it now possesses on a peace footing a railway regiment, and on mobilization an effective list of 326 officers and men in proportion. Such a result justly merits our attention.

A brief glance at the Railway corps employed in the American Civil War of 1861-65, will best show how far Prussia adapted the example to its own military system. The railway divisions of workmen formed in 1862 in consequence of the enormous extent of country traversed by railways, and the peculiar influence which they exerted upon the military operations, were placed under General MacCallum as general manager, with the title of Military Manager and Superintendent of the United States Railways. He was given complete control over the whole system of railways, and power to requisition what amount of rolling stock he might require. His first step was to form corps for constructing railway works, and for maintaining the traffic, and he concentrated the power over the whole in his own person. The engineers and workmen of all kinds who were associated together were civilians, and were employed temporarily as their services were required; but they were subject to severe military discipline; and it was this power, exercised alike by the military authorities and by the civil administration, which undoubtedly led to such excellent results being obtained. The important services which they rendered, gave rise to the institution of a similar body in Prussia. On 9th of May, 1866, the Prussian Minister of War published the basis of the organization for railway divisions to be formed in the case of mobilization. It stated the objects for which such a body was instituted, appointed the managing body, and specified the Staff, system of its formation, plant and functions. Three divisions were mobilized upon the declaration of war with Austria in the same year, and their employment forms an interesting chapter in a pamphlet translated from the German, "*De l'emploi de Chemins de fer en temps de Guerre.*" 1869.

Previous to this campaign, Prussia had formed a distinct body for carrying out a regular system of route service, and the experience obtained produced the "Organization of Route Service," approved by the King on the 2nd of May, 1867, but not made public. Thoroughly tested in the campaign of 1870-71, this organization was found to be based on sound principles, but imperfect in some of its details: the principal of which, and that from which the others sprang, being the strain thrown upon the Route Inspector-General's Department in order to meet all that was required of it. Large additions were made to its numbers during the war; and the great exertions developed by it coupled with the ability of those employed, prevented any mishap. But it was admitted on all hands that no single department could, except under the most favourable conditions, carry out for the future the duties with which this department was charged, viz., assuring the connection between the army and its base of operations, forwarding all men, horses, supplies, stores and materials along the lines of communication, and regulating the employment of the railways. The task of

maintaining the railway traffic was entrusted to this department, upon the supposition that one line of railway could be placed at the disposal of each army composed of several corps d'armée; but the inconvenience which soon arose from the unequal distribution of rolling stock, and accommodation afforded by the various lines, clearly showed the necessity of placing the whole system of railways under some central authority. The Executive Staff at the Royal Head-Quarters were therefore, during the remainder of the war, charged with the general direction of the railway transport, and control over the Railway corps. But this measure, though it relieved the Route Inspector-General's Department and did good work by so doing, gave more convincing proofs than before, that no organization for the service of communications would be complete, which did not provide during peace a distinct and trained department, to undertake the entire management and control of the railways. To this end at the close of the war, the Minister of War in concert with the Chief of the Staff organized the "Railway Battalion," in which the necessary training might be acquired, and by which without altering any of the principles of the existing military organization of Prussia, a large *personal* might within a limited time be obtained, subject in war to the Chief of the Army Staff.¹

The obligatory service exacted from all Prussians, made the realization of any railway scheme an easy matter, as far as mere numbers were concerned. A stroke of the pen could at any time provide a fixed annual contingent; and the peculiar military system allowed of these men being passed rapidly through the ranks into the reserve, ready to be called together at any moment. The objects therefore to be furthered by the creation of a Railway Battalion were little hampered by other considerations in organizing its peace footing. It should doubtless be the nucleus of all necessary railway formations for war; the technical training in peace should be such as to enable its staff to construct any works requisite; to repair without loss of time any that had been destroyed, and to undertake the entire traffic along railway lines of communication; it should in peace procure, prepare, and preserve all plant and materials required in railway work, and be capable of supplying with tools the detachments which would be organized in war.

It was determined that the railway sections of 1870-71, should form the basis upon which the battalion should be raised. The non-commissioned officers and men whose time of service under the colours was not completed were enrolled, and such plant as had been collected

¹ The necessity of having a military body, educated *during peace* to the technicalities of railways, was recognized from the events of the late war by our own Government as well as by the Prussians, for on February 2nd, 1871, the Inspector-General of Fortifications called for a detail of officers, non-commissioned officers, and men, with tools and plant for a detachment of Royal Engineers, to be attached to a division of 10,000 infantry, for the purpose of repairing and maintaining the railway communications. It is a matter for regret that the report of the Committee to whom it was referred has not been made public; but the correctness of the views they embodied in it, has been established by the success of the Prussian organization which was subsequently published.

for their use during the war and such as had been taken from the French and retained by the Peace of Versailles, was appropriated to the battalion, and stored in its dépôt in Berlin. A royal order of May 19th, 1871, decreed its constitution. The Major in command and the Adjutant were appointed in June, and the rest of the officers during the following months. On October 1st, a force amounting to 330 rank and file took up its quarters in barracks assigned to the battalion in Berlin. The officers were drawn from the Engineers; 60 non-commissioned officers and men were enrolled from the demobilized railway sections; 234 from the Pioneers, infantry, and re-engaged men of other arms still serving; and a contingent of 36 recruits and three-year volunteers. All were of a trade useful in railway work, smiths, carpenters, miners, quarrymen, and the like.

The Inspector-General of the Engineer Corps was given the superintendence of the discipline and economy, the Chief of the Staff the technical training of the Railway Battalion—a disposition which has given every satisfaction. A knowledge of all European railways, and acquaintance with the resources in rolling stock of all the lines in the Empire, whether State or private, is at once the duty of all officers of such a branch as a railway battalion, as well as of the Staff of the army. To control and direct the technical work of a body in constant intercourse with the various lines of the Empire, was wisely entrusted to the General Staff, and could not fail to be to the advantage of both. The relation which naturally sprang up between the officers of the Battalion and the Staff, has given rise to the sentiment sometimes expressed by their fellow officers of the Pioneers, “the officers of the Railway Battalion obtain everything they want through ‘the Staff.’” It was found that it was only by constant intercourse with the officers of the Staff, and with the railway and telegraph employés of the various railways, that the officers of the battalion could be trained, and keep themselves informed of the progress of State and private lines in course of construction, of the amount of rolling stock in use, of the telegraph lines last established, and of the value of instruments and tools lately invented. The officers of the battalion were thus enabled to express their ideas to the Staff, benefiting them by the experience they gained daily, and having an opportunity themselves to study the special work of the Staff. A relation between the two of such a nature was held to be necessary to prevent friction between any of the departments—employers and employed—charged with such various work in war as the rapid transport of troops; with maintaining supplies of all kinds; with perfecting projects for establishing a second line of way along the most crowded lines, and with constructing new ones. In peace the railway department of the Staff were also charged with training officers to the knowledge of railway service, directing the transport of troops out for manœuvres, and of the various “classes” when called out for drill and returning home; preparing every detail for transport in war; collecting statistics about foreign railways; examining, from a military point of view the proposed construction of any lines; and finally studying all subjects for the advancement of the military railway service. In these

matters the officers of the battalion were frequently consulted, and the result has been that this branch of the army is popular.

The peace-footing organization of the first battalion has been followed in the recent augmentation into a regiment.

It was composed of a staff, 4 companies, and a dépôt:—

STAFF.	{	1 Field-Officer (Colonel or Major) Battalion Commander.
		1 Second-Lieutenant, Adjutant.
		1 Surgeon and 1 Assistant-Surgeon.
		1 Paymaster and 1 Aspirant-Paymaster. ¹
		1 Sergeant-Major, Quartermaster.
		2 Non-commissioned Officers, a draughtsman and clerk.
		1 Drum-Major.
		1 Armourer.
EACH COMPANY.	{	4 Officers (1 Captain, 1 First-Lieutenant, 2 Second-Lieutenants.)
		18 Sergeants and Non-commissioned Officers (1 Sergeant-Major, 4 Sergeants, 12 Under-officers).
		2 Buglers.
		3 Tradesmen.
		1 Hospital-Assistant.
		100 Lance-Corporals and men.
DEPÔT.	{	1 Captain and 1 Sergeant, in charge of a large and valuable store of war material.

Upon mobilization each company is augmented into two CONSTRUCTION COMPANIES and one TRAFFIC COMPANY, making an establishment, on a war footing, of four traffic companies and eight construction companies. Also a RESERVE DIVISION, consisting of a Staff, two companies and a section of tradesmen. Each of the construction companies has a train of five waggons for the transport of tools and material.

It is evident from what has just been said, that on the declaration of war the system on which the men have been trained is abandoned. The peace companies of the battalion give place to mobilized companies of a different organization each complete in itself, independent and acting upon its own responsibility; the whole directed by one head, but under officers whom most of the men do not know, and non-commissioned officers ignorant of the temper, individuality, or abilities of those with whom they have to deal.

Why is such a course adopted? The answer lies partly in the military system of Prussia. The whole army is under the same disadvantage. The service for all is three years under the colours, four in the Reserve, and five in the Landwehr, and the military system has been developed by the national character. Further reasons which determined the constitution of a railway battalion during peace, and not independent companies attached to corps d'armée, may be

¹ Awaiting commission.

² Superior rank to our Corporal.

traced to the facility afforded by such a system to recruiting, and more especially to a fact already alluded to. The lesson of the last war showed the original idea to be untenable, that it was possible to place one line of railway at the disposal of each army, to be worked by the railway companies belonging to the several corps d'armée composing it. Centralization of the authority over the whole was proved to be indispensable. Isolated sections experience showed, could not be detached from their army corps to perform extraordinary work requiring a more powerful *personnel*, without danger. Moreover a battalion could be supplied with a valuable stock of plant and material, which it would not be advantageous to entrust to independent companies. In short the following were the grounds for constituting a railway battalion: it enabled a large and valuable stock of plant to be collected in the dépôt in Berlin; officers and men could be rapidly passed through its ranks into the *Beurlaubtenstand*¹, where they would be available at any moment and yet without cost to the State; it ensured similarity of procedure, and uniformity in material; and lastly, it was in itself a school of instruction for the future.

The men were given the same equipment as the Pioneers of the Guard, and an uniform only differing by having the distinguishing letter E (*Eisenbahn*) in yellow, instead of the number of the regiment. They were armed like the Pioneers, at first with the '68 pattern of the needle gun, subsequently altered in 1875 to an improved form of chassepôt suited to metal cartridges, and they now have a special form of the Mauser rifle similar to that known as the *Pioneer rifle*.

In addition to the military training which the battalion received to enable it to become part of and manœuvre with the Guard corps, in the same way as the Pioneer Battalion with its corps, a regular scheme for its technical training was laid down. It provided for the theoretical instruction and practical education necessary in laying down, repairing, or destroying all works belonging to a system of iron way, including a scientific teaching in all branches of the art of construction, and a knowledge of law so far as it affects railway matters.

The rolling stock appropriated to the battalion consisted of two locomotives, two carriages, two guards' vans with baggage compartments, and two trucks. With these it was practised in rapid embarkation and disembarkation of men and material; as well as engine-driving, stoking, taking to pieces and cleaning the machinery employed. In case of service away from a railway, each company on peace footing had the following waggons which, except the office waggons, are similar to those of the bridge equipment, and of the same pattern as those of the rest of the army. They were built by a firm, Dittman, in Berlin, who contracted for it in July, 1872, and may be found in detail in the official "*Zeichnungen der Fahrzeuge der Brückentrains, Berlin, 1874.*" They are four general service waggons with four horses for tools; two with four horses for the transport of prepared girders and timber ready to be fitted together; two for baggage, with two horses; two office waggons for repairing and

¹ The *Beurlaubtenstand* comprises all who have already served and have passed to the Reserve and Landwehr.

working the telegraph. The Battalion Commander had, in addition, a baggage waggon. These forty-one waggons formed the transport train with which the battalion practised loading and unloading in its Spring route-marches.

In addition, each company in its annual manœuvres or upon taking the field, had the power of requisitioning private boards for a train of twenty-one carriages for the transport of the men and material complete, retaining it till the close of operations.

The tools for the complete equipment of the eight construction companies were in temporary stores in Berlin until the end of 1875, when a large building with eight magazines, one for each company, was erected in connection with the new barracks for the regiment at Schœnefeld. An officer (a captain of the Battalion) and a sergeant were placed in charge and lived at the dépôt, superintending the issue and storage of all tools, &c.; horses alone were wanting to complete the field establishment. The requisite horse-cloths, harness, whips, hatchets, bill-hooks, lanterns, oast-measures, forage and strappings complete, were kept in the company stores. Upon mobilization the ten waggons are distributed between the two construction companies, into which each company on peace footing is formed. These five will only carry half the materials of the company; but as in practice the restoration of a line destroyed by the enemy is begun from both ends, the other half is left in the special train which has brought it.

The estimate for rolling stock, waggons, and tools for the Railway Battalion in 1872, was £15,285, and was largely exceeded. The total expense of organizing the Military Railway Service, including the purchase of land for a station and practice ground and the cost of building a barrack, amounted to £140,880.¹ The tools and rolling stock purchased in 1872, and added to those of the demobilized railway sections, completed the battalion establishment of plant and material.

Immediately after the Railway Battalion was definitely constituted, all officers who had served during the war and who were on the railway staff in civil life, were enrolled as part of the reserve of the Battalion, whatever arm of the service they might have belonged to when with the colours. The effective officers of the Battalion were at first recruited from the Infantry and Engineers alike, and it was hoped that in future the majority could be drawn from the former. Experience soon showed that a greater technical knowledge was required than Infantry Officers could as a rule acquire in the time allotted, unless they were previously acquainted with the subjects of study; and it was found necessary to call annually for volunteers from among the Engineers, previous to their entering the practical school for Artillery and Engineer Officers.

From this school they generally entered the Battalion as second-Lieutenants, and remained with it at least three years, in order to learn successively the different branches of construction, working, destruction and rapid repair. Under the senior officers of the Battalion they studied "Technical Railway Management," as given

¹ These figures are taken from the report of a Swiss officer to his Government.

by *Heusinger von Waldegg*, in "Technische Dienst Instruction für das "Königliche Preussische Eisenbahn Bataillon;" "Telegraph and "Signals," by *Baron von Weber*; "Machinery Instruction," by *Paulus*; "Report upon the Employment of Railways during the American War." Mathematics and drawing also formed part of the course. The above works supplemented by verbal instruction in rapid repair and destruction of railway works, mining, and destruction of tunnels, formed the theoretical course. The application of it to practice began in April, and lasted till October of each year, either upon the practice ground of the Battalion at Schöneberg, or when attached with men to railways belonging to the State. No one was permitted to make a speciality of any branch, by which arrangement all were trained so as to act in any capacity. Though officered in this way by Engineers, the Battalion was always independent of the Engineer Corps, and received officers of other arms if over two years' service and duly qualified; they served for the first year on probation.

The Battalion was kept up to a strength of about 500 men, and received annually about 160 recruits, furnished in certain proportions by each district. The non-commissioned officers were principally from three-year volunteers employed previously on railways. The annual contingent was drawn from railway employés, or such trades as are employed in railway work, carpenters, smiths, quarrymen, and the like. Only Locomotive Superintendents and Engineers of the permanent way were admitted as one-year volunteers, and after their year of service were passed into the reserve of the Battalion, if they did not wish to obtain their commissions. A number varying yearly, but always considerable, availed themselves of this privilege, by which their military service was turned to profit in their civil profession. The plan was economical to Government. It was a good plan because it proved successful, and any inconvenience was easily remedied by increasing or diminishing the contingent. In order to train a large number of men, it was commonly the practice to allow even three-year volunteers to return to their profession after two years with the colours, rejoining whenever required.

The organization and armament of the Railway Battalion being similar to that of the Pioneers, the recruits were put through the same training. It received the annual contingent in the beginning of November, the three-year volunteers on the first of October, and one-year volunteers in the middle of the same month. A certain number of recruits were selected at the outset and joined the three-year volunteers, with a view to being trained as under-officers; by which plan that much vexed question of the supply of under-officers in the German army was considerably relieved for the Battalion. Military exercises and the theory of war formed the recruits' first course of instruction. They passed successively through the regular drill of an individual soldier, through that of a company, and that of a battalion; two months to each of the two former, and one to the latter, without leave of any kind. For one hour each day of this period they received a lecture on military subjects. During the training of the recruits, the remainder of the Battalion was employed

in the workshops as mechanics, carpenters, smiths, &c., repairing tools, improving or altering the rolling stock. In each company, under-officers who had been previously trained by the officers, gave technical instruction in the machines and telegraph instruments; musketry practice completed the winter course. Practical work began in April upon the practice ground at Schöneberg; picketting out and completing a formation level, curves, changes of slope; destruction and repair of lines by various methods; permanent and temporary stations; construction and leading into stations of telegraph lines; establishment, charge, and boring of mine shafts; and details of bridges and tunnels. Particular attention was paid to the hasty construction and repair of bridges, both by means of material collected on the spot and by such as was carried by the Battalion in its column of transport ready made up and easily put together. During the summer each company sent four or five non-commissioned officers to be attached to private railways boards, to learn the duties of station-master, train-conductor, engine-driver, telegrapher and engineer of a telegraph line; and every year in turn three-fourths of the men of the Battalion under their own officers, were detached to construct lines strategically important, or advantageous to the public. Continual applications were made for the services of the men to repair accidents to the lines, and damages from storms and floods, all of which were readily acceded to by the officer in command, and promptly carried out. When employed on this work for private railways, the boards paid the men extra working pay amounting to about 1s. 6d. a-day; the officers reserved their independence, and accepted no emolument. The ordinary pay of the officers and men was the same as for the rest of the army. By the summer of 1875 a sufficient number of men had been trained for the duties of the subordinate staff, superintendents, stokers, &c., and the practice of detaching non-commissioned officers to learn these duties was given up. During summer there was a weekly parade for drills, and the Battalion was required to be present at reviews and garrison parades. It furnished its own guard. It would be impossible in even a sketch of the practical instruction given, to omit entire mention of what disposition was made of time.

An ordinary day was much as follows:—

5 a.m., Réveillé; 6 a.m., Breakfast (coffee); 6.30 a.m., a general parade in two ranks, and roll called by the orderly non-commissioned officer of the day. Orders for the day's work and such as the Captain in command issued were read out, and the officers then inspected and detailed the working parties. The same men always worked together, and only the non-commissioned officers in charge were occasionally changed; each party performed the same work constantly, and was therefore perfected in only one branch, but the rapidity was increased. The tools were in charge of the men who used them, and were not returned into store daily; the non-commissioned officer of each party checked them after work, and all repairs were done by a workman at the general dépôt, close to the barracks. At work, the men wore working frocks and trousers of white serge.

Work continued from 7 to noon, with a quarter of an hour's rest at 10 o'clock; from 12 to 1 they broke off for their mid-day meal of bread and sausage, or bacon, brought from barracks, and which they eat where they had been working. Work was resumed at 1, and at 4 p.m. they returned to barracks; at 5 o'clock they had their principal meal, after which till tattoo the men were at liberty. Four days in the week they worked eight full hours; Wednesday and Saturday only six hours. On Sundays there was generally an inspection parade at noon, dinner at 1, and the men were then free to go where they liked within certain bounds.

Rapid destruction of the permanent way was practised on the manœuvring ground of the battalion at Schöneberg, both by taking to pieces and removing rails and sleepers, and by blowing up the joints of the rails with cartridges of dynamite. This latter method has been almost entirely handed over to the Cavalry, who use one pound cartridges.

The practical work done by the Battalion for instruction, was small in comparison with that done since the time of its formation in 1871 in the interests of private railway boards, in repairing the damage from inundations and accidents. Between the time of its constitution and the end of 1872 it had no practice ground of its own, and was employed altogether in this way, by which at the outset it established its public utility, raised a feeling of confidence between itself and the civil engineers with whom it was employed, and paved the way to that good understanding which now exists with the various railway boards. In the first year of its existence, 1872, the battalion constructed 100 miles of permanent way, two termini with their points and crossings, one roadside station, enlarged four termini, restored two dykes destroyed by inundations, and a railway bridge at Rykgraben near Greifswald.

In 1873, 4 officers, 9 non-commissioned officers, and 76 men changed the iron-way of the line from Altkirch to Dammerkirch, from double-headed to Vignole rails, with the points and crossings in the termini, in three months. In Silesia, one company, in the same time, constructed 15 miles of permanent way, five iron bridges, and ten points, on the line from Kamenz to Frankenstein. Another detachment in Thuringia, 16 miles of way, a temporary bridge of 16 feet span, and the necessary signals for the whole portion.

A detachment of 120 men enlarged the terminus of the Eastern Railway at Berlin, adding sidings and sheds. A detachment was further employed towards the end of the year in removing granite rock by blasting with dynamite, for the Górlitz-Reichenberg Railway. Very valuable observations were made during the course of this work.

In 1874 the Battalion made the tunnel under the Circular railway round Berlin, where it passes over the Battalion's practice ground. It was complicated by the necessity of not interfering with the overhead traffic. It is now used by the Berlin-Dresden Railway, as well as by the Battalion for its line to Zossen.

On the Berlin-Dresden line a detachment of carpenters and miners of the Battalion were employed in changing two level-crossings, so as

to carry the lines over the roads. The roads were sunk 9 feet 10 inches, and the lines raised on a wooden bridge 650 yards long. Civil labour was called in to assist them in this, and the work continued night and day without interruption to the traffic, and without any accident.

In 1875 a luggage train off the line, on the Berlin-Dresden Railway was replaced, and the way repaired by 2 officers and 90 men. The traffic was resumed after twenty-one hours' work.

On December 9th, 4 non-commissioned officers and 14 men were despatched at the earnest request of the Berlin-Magdebourg Railway, to relieve their own staff, tired by their exertions to meet the traffic after a short suspension from snow.

But the principal work of the Battalion this year was the construction of the line from Berlin to the artillery practice ground at Zossen. It was undertaken to afford the Battalion a ready means of instruction in the technical working of a railway, the whole administration being left in its own hands. Its total length is 30 miles, and it has three stations. It was commenced in the first week of April by nearly the whole of the Battalion, which had left Berlin in three detachments on March 31st, and had been cantoned near Zossen, Blankenfeld, and Mariendorf. These returned on May 19th, and were replaced by the 3rd company, consisting of 3 officers, 10 non-commissioned officers, and 90 men, who completed it in the first week in July. It was opened in the middle of the month, and the direction of it given to the Battalion commander, with a staff of 1 Captain¹ as Traffic Manager, 1 Lieutenant as Secretary, and 1 Lieutenant as Locomotive Superintendent. The whole management of the line was entrusted to the Battalion. An augmentation of its numbers had been contemplated before, and being necessary for this purpose, was approved by the Emperor in August. By the middle of September a second battalion, organized on the same footing as the first, was being rapidly pushed on with, as well as the barracks, buildings, and stores for it at Schönefeld; and till these should be completed, quarters were prepared at Tempelhof and Schöneberg.

The Budget of 1876 for Military Service, provided for a RAILWAY REGIMENT of two battalions, and declared its creation necessary, both to provide the requisite staff for the numerous lines, which would have to be worked in war, and to give instruction in railway work to a large number of the Beurlaubtenstand. This latter point is readily understood when we remember that Prussia was at this time contemplating handing over all its railways to the Empire. The Budget provided for the following addition to the peace footing; 3 Field Officers, of whom 1 was to command the regiment, 1 the new battalion, and 1 to be Supernumerary, effective, but without special command; 2 Captains of the first class, 1 Captain of the second, 4 first and 14 second-Lieutenants; total 24 Officers. 2 Surgeons, 1 Paymaster, 1 Armourer, 4 Sergeant-Majors, 4 Vice-Sergeant-Majors, 16 Sergeants, 53 Under-Officers, 48 Lance-Corporals, 353 men, 12 tradesmen, 2 Aspirant-Paymasters, and 4 Hospital-Assistants; total 500.

¹ By royal order of 8th February, 1876, a staff officer.

This augmentation allowed of a second battalion being formed, with the same effective as the first, except for the addition of another second-Lieutenant to each company, and of one to the staff, of the second battalion.

It was completed by March 1st, 1876.

The peace footing organization of the Railway Regiment is therefore, a staff, eight companies, and a dépôt, and consists of :—

- 4 Field-Officers, of whom 1 commands the Regiment, 2 the Battalions, and 1 is without special command.
- 8 Captains, 8 First-Lieutenants, 27 Second-Lieutenants.
- 2 Surgeons and 2 Assistant-Surgeons.
- 3 Paymasters and 3 Aspirant-Paymasters.
- 2 Armourers, 1 Drum-Major, 9 Drummers and Fifers, 8 Hospital-Assistants, 24 Tradesmen.
- 9 Sergeant-Majors, 8 Vice-Sergeant-Majors.
- 32 Sergeants, 103 Under-Officers.
- 98 Lance-Corporals, and 700 men.

On a war footing, each company is augmented into two construction and one traffic company, and the instructions of July 20th, 1872, on the Service of communications, then regulate the railway organization. A General or Field Officer is placed in charge of the railway-service in the field, with the title of Chief of the Field Railways, under the orders of the Inspector-General, who has general superintendence of the entire route-service. He arranges for the transport of stores, reserves, &c., and for the concentration of the several Army Corps, he organizes the railway service at the seat of War, and makes new sidings and works if required.

Attached to him for duty are :—

The Officer commanding the Prussian Railway Regiment.

Two officers of the general Staff, two superior railway officials and four clerks.

Within certain limits fixed by the regulations, the Chief can dispose of the rolling stock on all home lines, and those on occupied territory, exercising this power through—

1. Military railway directors, for railways within the theatre of operations. This limit is fixed, in every case, by the Emperor, and is considered to extend 80 miles from the front.
2. The railway division of the General Staff at home, to regulate all military transport over lines not within the theatre of operations, and which are worked by their own officials.
3. Railway Line Commandants, in charge of certain home-lines and systems, and the military transport over them.
4. Railway Station Commandants, who are under the orders of a Military Railway Director (1), or of a Railway Line Commandant (3), according to the position of their station.

The Prussian Railway Regiment (sixteen construction and eight traffic companies), is at the disposal of the Chief of the Field Railways, for employment in repairing existing lines or in constructing new ones, and also in working them. For this purpose each traffic company is

organized to work a section of line of 28 to 37 miles, with an effective of:—

6 Officers (1 Captain Commanding, 1 First-Lieutenant, 4 Second-Lieutenants as Station Superintendents).

41 SERGEANTS AND UNDER-OFFICERS.	{	1 Company-Sergeant-Major.
		4 Station Masters.
		1 Booking clerk.
		12 Engine-drivers, 7 train-conductors, 7 baggage-masters (guards).
		3 Permanent-way overseers.
20 LANCE-CORPORALS.	{	6 Telegraphers.
		3 Guards.
		1 Telegraph foreman.
		2 Gangers of platelayers.
139 MEN.	{	2 Stationary-engine-drivers and 12 stokers.
		4 Makers-up of trains, 18 pointsmen.
		14 Platelayers, 7 workshop artificers.
		4 Carriage greasers, 2 engine cleaners.
		55 Watchmen and gatemen.
		35 Breaksmen.

There are sixteen construction companies, each with an effective of:—

9 Officers, 1 Captain (Chief Engineer), 2 First-Lieutenants,
4 Second-Lieutenants (engineers of the permanent way),
1 locomotive engineer, 1 telegraph engineer.

1 Surgeon, 1 Paymaster.

25 Non-commissioned Officers.

176 men, including 2 buglers.

11 men of the train and 11 horses.

Each is accompanied by its column of transport-waggon.

1 Under Officer in command.

9 Men of the train, 18 horses, and 5 waggon.

The construction and traffic companies are distributed as required, among the Railway Directors and the Railway Line Commandants. They can be increased from their dépôts if necessary; for which purpose a reserve division for each battalion on peace footing is formed. Its effective is:—

STAFF. { 1 Officer, 1 Surgeon.
 { 1 Paymaster, 1 Armourer.

TWO COMPANIES, { 6 Officers.
EACH WITH { 25 Non-commissioned Officers, 2 Buglers,
 { 1 Hospital assistant.
 { 176 men and 2 horses.

A SECTION OF TRADESMEN, { 1 Officer.
TAILORS, SHOEMAKERS, { 6 Non-commissioned Officers.
SADDLERS, &c. { 100 men.

All orders referring to the Railway Regiment and its work, are given through the Officer commanding it.

For every 280 miles of way used, a Military Railway Director is appointed. He is a Field Officer (Colonel), and his principal duty is to organize the train-service over lines on occupied territory, and over such home-lines within the theatre of war, as are prevented, through the war from carrying on the service unassisted by the military authorities. He regulates both the transport arrangements, and the technical working and management of the lines under his charge.

He is assisted by a staff of:—

1 Field-Officer in charge of the Transport Department.

4 Officers to superintend the Traffic Department.

The Field-Officer carries out his orders for the transport-service, through 1 Captain as Adjutant, 1 Staff-Surgeon, 1 Field-Paymaster, and 1 Officer of the Intendance.

The traffic department contains a manager's office, an engineer's office, an accountant's chest and office, and a telegraph inspector's office; the establishment for these is detailed in the "*Révue Militaire de l'Etranger*," of November 26th, 1872, to which the writer would refer all interested in the subject, as one of the most valuable translations from the German that has appeared in that valuable journal.

To work the line, to repair, restore, or enlarge where necessary, a military traffic inspection and from two to four companies of the Railway Regiment are appointed to every 70 to 140 miles. A traffic inspection consists of 1 Captain, 5 officers, 14 non-commissioned officers, and 8 train soldiers.

The regulations laid down for the Prussian Railway Regiment govern the working of the lines.

It would be but a mere quotation from the Regulations of July 1872 on the German Route Service, to proceed with the functions and powers of the remainder of the departments under the Chief of the Field Railways, all of which may be read in the number of the "*Révue*" referred to above.

But the following extracts are compiled as the number may be out of print, or not easily obtainable.

Field officers are trained as railway line commandants during peace, and upon mobilization are appointed to districts. With the railway officials they arrange for the concentration of the army, borrowing rolling stock, drawing up time tables, and providing refreshments at stations determined upon. The conveyance of sick and wounded as they arrive at the hospitals of the district, is also regulated by them.

Railway station commandants enforce strict adherence to the time-tables, and arrange the police and military duties about the stations. They are informed as to what trains will run through, stop, or be unloaded at their stations; by which they will be enabled to provide for the wants of troops, horses and cattle. Certain arrangements are necessary at all stations, such as latrines, fixed platforms, and moveable ramps; a ward for sick unable to continue their journey, buckets for watering cattle, and cups or other vessels for men. The proper supply of refreshments is also regulated by them. All finance and accounts of the mobilized military-railway bodies alluded to are settled

by the field paymaster on the staff of the railway-district, with the exception of those of the field-railway companies. They keep their accounts separately and have separate pay-chests. The finance of those not mobilized is managed by paymasters belonging to their staff.

To provide the large number necessary to carry out the regulations, so far as they affect railways, very early steps were taken. An order of the Minister of War declared that after the 1st October, 1872, all employes of railways, whether belonging to the State or private boards, and who formed part either of the Reserve or Landwehr, should be enrolled in the Reserve and Landwehr of the Railway Battalion, whatever branch of the service they served in when under the colours. But it specified that this order only referred to those who had a special knowledge of the construction and working of lines, and not to porters and the like. All men of the Reserve and Landwehr are enrolled upon "Stammliste," under that branch of the service in which they served; and by the order in question, it was decided that the men affected should be borne on these lists as belonging to the railway branch; but should be able to have their names transferred to their former place in the lists, if they left the service of the boards and desired it. Officers as well as men were included in this order. Also since the constitution of the Battalion, the men upon quitting it have been enrolled on separate lists among the troops of the Landwehr; the officers according to seniority, upon two lists, those of the Reserve and of the Landwehr. The Railway Regiment now keeps a similar list corrected monthly from reports sent to them by the commanders of Landwehr in the various districts; and every year on May 15th, when the annual state is forwarded to the King, the regiment appends to the effective list of officers, that of the officers of the Reserve and Landwehr who have passed through it. The lists kept in each district of Landwehr contain the service, age, residence, and civil employment of every man and officer, and from this is determined their liability to, or exemption from, service upon mobilization. Twice a-year the district commanders of Landwehr furnish the regiment with a list of men employed on the staff of any railway who have not passed through the regiment. The employes of a line who thus become part of the Reserve and Landwehr of the regiment, include the staff for administration and issue of tickets, for working the rolling-stock, in charge of the way and stations, and workmen of various trades; the higher grades are, inspectors of traffic, of works of construction and of telegraphs, architects, foremen of works, railway engineers, locomotive engineers, foremen of machinery and workshops, overseers and comptrollers of the way, traffic superintendents, and assistant-superintendents of stations. The above, and very much more, forms the subject of the Landwehr Ordnung, and the Control Ordnung deals with the question of liability to and freedom from service amongst the employes. One extract will be given here, "All immunity from service ends, when the last class of Landwehr is called out." The lists are of the greatest importance to the railway boards, who are by their means in no danger of being deprived upon

mobilization, of all the officials working the lines, and they exemplify the unity of interests existing between the army and the State. Exemptions of officers and men are readily and easily made, without having, as would otherwise be the case, to pass from the district commanders of each Landwehr battalion, through those of the corps d'armée, for the decision of the Chief of the Staff, as commander of the Railway Regiment. As a further means of increasing the number of railway employes in the Beurlaubtenstand, inducements were always offered to officers, after their term of service, to accept positions on railway boards, and to men, appointments on the staff of the State lines. Only lately, the difficulty of getting under-officers to remain under the colours for a greater number of years, has obliged the German War Office to hold out to them the certainty of appointment in State railways after a definite number of years.

In the Army List of 1873, the First and Second-Lieutenants classed in the Reserve and Landwehr of the Battalion amounted to 43 and 118 respectively. In 1874 these figures had risen to 56 and 121. And in that of November 12th, 1875, we find in the Reserve, 1 First and 72 Second-Lieutenants; in the Landwehr, 8 Captains, 37 First, and 179 Second-Lieutenants, or a total of 297 officers.

The Army List of that date also gives the effective officers of the Battalion, (those of the second battalion had not been appointed,) as 1 Colonel commanding, 5 Captains, 5 First-Lieutenants, and 4 Second-Lieutenants.

Officers attached for Service: 2 Majors of the Engineer Corps. 4 Captains, 2 First, and 5 Second-Lieutenants attached from Line regiments.

Administration of the plant in store: 1 Captain.

Total, 1 Colonel, 2 Majors, 10 Captains, 7 First and 9 Second-Lieutenants.

In case of mobilization, therefore, Prussia has 1 Colonel, 2 Majors, 18 Captains, 45 First and 260 Second-Lieutenants, total, 326 officers, for the various requirements of railway transport. Each battalion on a war footing is, as we have seen, augmented into eight construction companies, and four traffic companies, with a reserve division of two companies and one section of tradesmen. These require 112 officers, so that there is a greater number than necessary for two such battalions. As for men, the system pursued of receiving a large number of one-year volunteers who brought with them a previous knowledge of railway matters, and who therefore could be passed rapidly into the Reserve; of extending the privilege so far to the others, as to allow them to leave the colours after two years; and of incorporating in the reserve of the regiment all employes of the railways, has more than met the requirements of the case. By the law of June 13th, 1873, upon the allegiance of public departments in case of war, the boards of railways are obliged to be prepared to convert trucks into carriages for horses and men, to provide for the transport of troops and supplies, and to furnish rolling-stock of every kind, as well as the necessary staff for repairing and

working the lines.¹ There is little or no difficulty, therefore, in raising the 6,000 men required for the service-establishment of the railway companies from railway officials, engineers and artificers liable to render military service, as well as from suitable men in the Reserve; and this without depriving the boards of the staff required to work the home portions of their lines; their services are called for by the Chief of the Field Railways as necessity arises, and the exigencies of the home railway service permit. If any are still available after the concentration of the army is effected, and the formation of the railway corps completed, the regulations upon the Route Service lay down that with the consent of the Chief of the General Staff, they may be incorporated with other *depôt* troops by the Minister of War, or they may be used to furnish guards and construct field-works for the protection of the lines, or to fill up the *depôt* of the Railway Regiment. In addition to the departments mentioned above, officials of the Government lines, not liable to military service, may be called upon for railway service in the field, by the authority of the Imperial Chancellor. Civilians may also be engaged for the same service by authority of the Chief of the Field Railways. The two classes last mentioned are attached to the railway companies as military officials.

A military organization carefully prepared during peace can alone develop the qualities required of such men, in the course of a war which may be protracted, and is sure to be subject to diversities of fortune; and General MacCallum, in his report to the United States Congress after the campaign of 1861-65, was most emphatic in his assertion that the experience and practice in the first two years as director of Railways, alone enabled him to undertake with any chance of success the enormous task imposed upon him. Convinced that to wait till war is declared to complete the smallest link in the chain, is to expose the whole to failure, the railway department of the Prussian Staff have taken active measures to prepare the principal stations along important strategic lines, so as to permit of troops being readily disembarked and sheltered and provided for; to establish permanent stores of provisions in the principal termini, and to train "Line commandants" to their duties during peace. They have also built "interrupting forts" (Sperr Forts) at intervals along important lines, to prevent the turning of a single fortress along a railway being sufficient to put the whole of the rest of the line in the enemy's power; Metz affords an example of this in the late war.

The most important work undertaken to provide instruction to the Regiment is undoubtedly the construction, maintenance, and working of the military line from Berlin through the wood of Kummerdorp to Zossen, the administration of which is entirely left in its hands. A translation of the statute organizing it in 1875, is given *in extenso*, both because of its value as based upon the joint reports of the Minister of War and the Minister of Commerce, Industry, and

¹ The tariff for transport and the use of stock is settled by the central committee, composed of delegates from the Federal States, but no indemnity is paid for the conversion of the trucks

THE GERMAN RAILWAY REGIMENT.

Public Works, and because of its instructiveness as the first publication of the kind relating to a military railway body.

"The following statute organizing the Government line from Berlin to the practice ground, based upon your joint reports, bearing date 31st July of this year, has been approved by me, and is forwarded to you to be carried out.

(Signed)

"WILLIAM.

(Countersigned)

"VON KAMEKE.

"To the Minister of War and the Minister of Commerce, Industry, and Public Works."

1st Article. Administrative Authorities.

The military line from Berlin to the practice ground is under the superintendence of the Royal Military Railway Department; it is controlled, on the one hand, by the War Office and the Chief of the Army Staff, and on the other, by the department charged with the supervision of Railways.

2nd Article. Managers.

The body of Managers comprises a Captain¹ and two Lieutenants of the Railway Battalion, in the capacity of General Manager, Secretary, and Locomotive Superintendent.

3rd Article. Executive Staff.

The "Military Railway Traffic Department" will carry on the traffic, the maintenance of works, and the administration of the line, under the General Manager¹. The Senior Captain of the Railway Battalion will be appointed Manager of the Traffic Department, with the following Staff as permanent members:—

1st. A Lieutenant in charge of the head office;

2nd. A Lieutenant, Locomotive Superintendent;

3rd. The officer in charge of the Battalion's dépôt, who will superintend the traffic at the dépôt of the military line, and the plant in the workshops;

4th. A Paymaster at the head of the pay office;

5th. Subordinate Staff—Clerks, draughtsmen, store-keepers, foremen of works.

Temporarily attached to the Traffic Department are a certain number of officers, non-commissioned officers, and men of the Battalion to work the line, and be instructed in the management of the traffic.

4th Article. Duties of the General Manager.

The General Manager will see that the administration and working of the line conform to the laws relating to them, and to the special directions issued by the authorities named in Article 1. He has full power to issue and enforce such orders, instructions, and bye-laws as relate to his department as he may think fit. He is charged with the correspondence of the managing body, and refers all questions which require the decision of the higher authorities; he represents the managing body (except in the case treated in Article 6); he gives

¹ By royal order of February 8th, 1876, a staff officer; and for battalion read regiment throughout.

judgment in the litigation of the line, and sanctions all contracts, except those specially reserved to other authorities. In carrying on the traffic of the line, he is never to lose sight of the main object for which it was intended, namely, to afford the means of instruction in the technical management of a railway to officers, non-commissioned officers, and men of the Railway Battalion. Everything is to be subordinate to the furthering of this end.

5th Article. Nomination of the Staff to carry on the traffic.

The Manager, the Officer in charge of the head office, and the Locomotive Superintendent of the Traffic Department, will take up their duties as part of the Executive Staff, upon nomination by the Chief of the Army Staff, as recommended by the Commander of the Battalion. This latter will appoint the subordinate staff of this department, the company to work the line (complete in itself, or combined with men from others), and the employés to superintend and be instructed in engine-driving, relieving them from time to time.

6th Article. Duties of the Manager of the Traffic Department.

The Traffic Manager will direct the work of the department, according to the orders and instructions issued by the General Manager, whose place he will fill in emergencies. He sees that all matters connected with the traffic and administration of the line are promptly carried out, directs the correspondence of the department, and has the use of a stamp, "Traffic Department of the Military Line "from Berlin to the Practice Ground." He is especially responsible for the maintenance, regularity, punctuality, and economy of the traffic, as well as for the discipline which should exist throughout the whole. All offences not committed when doing the duty of the railway, or in connection with it, are to be treated as regimental offences, and dealt with according to Article 1 of the Army Regulations of October 31st, 1872, by him or by one of his immediate superiors in the administration. The Traffic Manager has the disciplinary powers of an officer¹ commanding a detached company. When he is unavoidably absent, from illness or on leave, the Commander of the Battalion will appoint another officer to do his duty.

7th Article. Superintendence of the traffic.

The duties of the Company Officers detached according to Article 5, irrespective of those of the Company, will be regulated by Article 8 for the superintendence of the traffic.

8th Article. The details of the service and employment of the Traffic Department, as well as the special duties to be performed by the Manager, and by the non-commissioned officers and men of the Military Railway, will be given subsequently in *Regulations for the Service*.

9th Article. Administration of the Dépôt.

The Officer in charge of the unused rolling stock and plant, and of the workshops, will also purchase, store, and issue all plant, tools, and other material in his charge, and will keep the ledgers and account books. Special instructions are issued for his guidance in "Instructions

¹ By royal order of February 8th, of a detached staff officer.

"for the Administration of the unused Plant of the Military Railway "from Berlin to the Practice Ground."

10th Article. Administration of the Paymaster's Department.

The administration of the Pay-Chest will be superintended by a committee composed of the Captain who is nominated Traffic Manager, the Lieutenant of the head office, and the Paymaster of this department, who will form "the Committee for the Administration "of the Pay-Chest of the Military Railway from Berlin to the Practice "Ground." They have the use of the stamp of the Traffic Department, and will be governed by the regulations in force for a regimental pay-chest as modified and supplemented for the Battalion.

Berlin, 31st Aug., 1875.

The above Cabinet Order, as well as the accompanying Statute, are issued for the information of the Army.

(Signed.) VON KAMEKE.

The line was opened to the public in November, 1875, and was worked by each company of the Battalion for a month at a time. The officer who at first did the duty of Locomotive Superintendent, the Sergeant and Under-officers employed as engine-drivers, had been trained for a year previously on the Eastern Railway, and held certificates. For a week the regiment of Grenadiers, François Joseph, was conveyed daily to the practice ground at Zossen, returning in the evening. At another time, practice was given in loading and unloading such material as would constantly be used in war. An excellent example of the efficiency attained, and of the rapidity with which work can now be performed, is afforded by one of the latest services rendered. On the 17th February the Board of the Berlin-Dresden line applied to the Colonel in command for a detachment, to re-establish the communication interrupted by the flooding of the River Dahme, an affluent of the Spree, which had destroyed a large portion of embankment. Colonel Schulz lost no time in requiring explanations or, making enquiries of any sort whatever. Three hours after its receipt, the Chief of the Army Staff had been consulted, the company to furnish the detachment had received its orders, the material required for the work had been brought to the station and loaded; in fact every preparation had been made in one-eighth of the time in which civil engineers and men, under the most favourable circumstances, could have been collected together. On Friday the 18th, the same morning that they arrived, they began the works in the bed of the Dahme, and at about the same hour on Monday morning the heaviest traffic was able to pass over the gap on a permanent bridge, 40 ft. long, of wooden longitudinals, supported on four rows of piles. The work was directed by Major Golz.

A glance at the Budget for 1876 shows that the advancement of the new regiment is being pushed forward vigorously, and that there is no appearance of allowing it to remain inactive. The sum of £3,000 is asked for as a special item this year to purchase an iron bridge, a practical trial of which has been strongly recommended by the Great General Staff. It was designed by Mr. Stern, engineer of

Carlsruhe, for the purpose of rapidly and efficiently replacing railway bridges which have been destroyed, and its construction has given satisfaction to the Prussian Minister of Commerce. It provides £2,000 for the railway to the practice ground at Zossen; £300 for special tours of reconnaissance to be made by the regiment; £1,100 for the annual special manœuvres; £10 for small-arm ammunition for musketry practice, and £1,050 for contingencies. A new item occurs amongst the sums devoted to the Great General Staff, £850 to training field officers of the Staff to the duties of "Line Commandants," duties which we have seen play an important part in the route service organization scheme. It is proposed to name three this year, but from the tone adopted it is certain that this number will be added to very shortly. "The increase is necessitated by the complication of military transport, and the desirability of practising the work of 'Line Commandants' during peace. Only three are named, as the best scheme for their duties is not yet decided upon." A sum of £2,610 is asked for for the office expenses of the military railway authorities, printing of time-tables, stationery, copies of regulations and the like. This item shows an increase of £1,050 upon last year.

In any subsequent war Germany will possess in the Prussian Railway Regiment an organization which will have an influence hitherto unparalleled, upon all military operations. Its creation has given rise to a new arm. Exercised in peace to manœuvre independently under the exclusive direction of its officers, it will act in concert with the army, assisting in invading, occupying, defending or evacuating strategic points, represented by the principal stations. It will be engaged in the most exposed part of the iron road comprised within the field of operations, and will be called upon to show not only the punctuality and precision of railway traffic, but discipline, military spirit, and power, as well as science, in manœuvring. As part of the valuable system of route service possessed by the Germans, it enables them to spread rapidly into the enemy's territory, to seize and turn to their own use in a moment all local resources, paralysing the patriotism of the population; with cavalry to flank and reconnoitre in advance, it is the most rapid instrument in bringing up reinforcements of infantry to an important station seized by cavalry, or a central dépôt of stores insufficiently defended. When acting on the defensive, the enormously extended frontier of Germany renders this arm equally indispensable, in order to meet the enemy in overpowering numbers at any point. Nothing perhaps strikes a reader of the "History of the War by the German Staff" with greater force than the following quotation from page 82 of the first volume:—"The report made in the winter of 1868-69, served without any modification, as the basis of the principal dispositions taken upon the declaration of the war in 1870. In anticipation of the adoption of the plan proposed, all preparatory steps had been completed, down to the smallest detail; and upon His Majesty's approval of it, after his arrival in Berlin, there remained only to write in the day for commencing the mobilization, in the tables of the movements and transports, which had been prepared for each fraction of the

"army by the railway department of the Staff, and the movement was "commenced."

Railways enabled MacMahon to withdraw his army after defeat at Wörth to Chalons, where he was joined by corps also brought by rail from Belfort and Paris, but the want of organization in the administration caused great suffering to the men, who could not leave their carriages for an incredibly long period. Railways permitted Canrobert to quit Chalons at the last moment with a large portion of his corps, and take part in the decisive battles round Metz; but on the other hand, the absence of a trained staff to restore the portion of line between Frouard and Metz, destroyed by the Prussian cavalry on August 13th, obliged him to leave a large part of his artillery behind, a result which weighed heavily against the French in the issue of the battle of the 18th. It was due to the re-establishment of the lines by the Prussian and Bavarian Railway Corps, and in particular the line from Amiens to Ronen, that the investment of Paris on the north could be assured over a very wide circle by a much smaller force than that opposed to them. The loop-line, 63 miles long, from Remilly to Pont-à-Mousson, constructed by the First and Fourth Prussian Railway Sections, to avoid Metz, is a matter of history. It is no exaggeration to say, that the lamentable conclusion of Bourbaki's expedition eastwards, was due to the inefficient administration of the railways he was employing. Between Bourges and Chalons-sur-Saône, his army could not be moved backwards or forwards owing to the block on the line. They remained *eight days* in the carriages, in intense cold, and without sufficient food. Could anyone expect them to have retained their morale when they arrived at their journey's end?

With such facts before us, it cannot but be a matter of regret that England makes no effort to provide a military body trained to a practical and technical knowledge of railway management. Will it require an experience more costly than even that of the Crimea, to show that the time for the further development of this branch has arrived? In case of invasion, no doubt patriotic ardour will hasten to provide the means to the same end; railway officials throughout the kingdom will afford their utmost assistance. But zeal and patriotism, without a pre-arranged and organized system, in a matter requiring the greatest precision and method, will not suffice. There would not be much difficulty in creating a military body similar in character to that which has formed the subject of this article, and which might become the nucleus of further expansion in case of war either at home or abroad. We shall do well, therefore, to remember that the "extraordinary requirements arising out of recent great changes and "improvements in the means and appliances of warfare, render the "necessity more imperative than formerly, that dependence should not "be placed upon exceptional talent, nor upon lavish expenditure, to "provide at the moment of action all that may have been omitted during "peace in our administrative organization."

NOTICES OF BOOKS.

Historical Records of the First Regiment of Militia or Third West York Light Infantry.—By Captain G. A. RAIKES, Third West York Light Infantry Militia; Lieutenant-Instructor of Musketry, Hon. Artillery Company. Price 21s.

CAPTAIN RAIKES deserves the gratitude of all connected with the Third West York for the enormous amount of labour and time which he must have expended in compiling the records of the regiment. The interest of the volume is of course mainly local. Captain Raikes must, however, have at hand an abundance of information connected with the old constitutional force, considered as one branch of national defence. It is to be hoped, therefore, that in view of the exhaustion of the present edition of the records by local requirements, the author will in good time turn his energies and abilities to the preparation of the work from which he has here advisedly withheld his hand, namely, a general history of the militia of the United Kingdom.

Captain Raikes will forgive us reminding him that he has somewhat inverted the importance of the titles of the corps of which he has shown himself so able an historian. His avowed object in compiling the records is to aid in maintaining *esprit de corps*. The *esprit de corps* of a militia regiment is intimately connected with locality; the place of honour in the title page should therefore be given to the "West York Light Infantry," not to to the "First Regiment of Militia." This task of plain and simple duty conscientiously performed, reflects credit on the West Riding; it is as belonging to the West Riding of Yorkshire that we would see the *esprit de corps* of the regiment fostered, and not merely as the fortunate (?) corps whose precedence is the result of an after-dinner ballot.—(O.)

Leitfaden für den Unterricht in der Dienst-Kenntniss auf den Königlichen Kriegsschulen.—By Captains SCHNACKENBURG AND BARTELS. Berlin. A. Bath, 1876, Pp. 93.

It is not the lack of professional books that the German Officer can ever plead as an excuse for ignorance of any part of his duties. Their name is simply legion. The present "Guide to Instruction in Military Regulations at the War Schools," is one of many others which treat of the same subject; in this case, however, the book has the official sanction of the Inspector General of Military Education, and therefore its facts may be accepted as perfectly correct, which indeed on investigation they prove themselves to be.

"Dienst-Kenntniss," or as it is here translated, "Military Regulations," includes at the War Schools not only a knowledge of the organization and formation of the army, but also of the arrangements for recruiting, mobilization, and preparation for war, the command

and administration of the army, interior economy, garrison duty, duty on the line of march, in quarters and in camp, and military law.

Such a vast range of subjects cannot obviously be exhausted in a pamphlet of some 90 pages. It is a mere bald sketch of the subjects, intended to be enlarged upon and amplified by the instructor in his lectures. Consequently the guide is of too cursory a nature to be of much use as a book of reference to any but a German Officer. Still the sketch of the organization of the army, corrected up to the most recent date, will be found sufficiently full for those at all acquainted with the German Army who wish for information but have not the inclination to consult the more detailed works of Fröhlich v. Witzleben or v. Helldorf.

Sur la Dispersion Naturelle des Projectiles et la Loi des Erreurs.—Par ALOYS VAN MEYDEN, Capt. Artillerie. Lusanne, 1876.

A knowledge of the laws of the deflection of projectiles is necessary to the practical artillerist, in order to enable him to form a just estimate of the probable performance of his gun under certain circumstances. An acquaintance with the calculus of probabilities, as laid down by recent mathematical writers, and with the method of least squares of Legendre, is essential to a proper comprehension of the subject. The object of the pamphlet before us is, taking the established formula for granted, to show its application in order to determine under certain circumstances the performance of any particular gun:—i.e., the chance of hitting an object in a certain number of rounds. The subject is gone into very fully and in a few clearly written pages; the question is brought thoroughly within the grasp of anyone possessing the necessary mathematical qualifications to follow the reasonings of the author. We strongly commend this pamphlet to the attention of scientific gunners, as well as to those engaged in astronomical or geodetical operations, as being a clear exposition of a difficult subject.

Campaign of 1870-1. The Operations of the Corps of General v. Werder. Compiled from the Official Documents by LUDWIG LÖHLEIN, late Captain 1st Baden Body Guard Grenadier Regiment. Translated by Lieutenant F. T. MAXWELL, Royal Engineers. Gale, Chatham. P.p. 171. Price 5s. 6d. Weight 1 lb.; size $8\frac{3}{4}'' \times 5\frac{1}{2}'' \times \frac{3}{4}''$.

LIEUTENANT MAXWELL has done good service by placing before the public a translation of Löhlein's account of this portion of the campaign of 1870-1. The operations of the XIVth Corps are very interesting. General Werder fought long and well against a force far superior in point of numbers, though inferior in most other respects. It would be difficult to say whether the regiments or the Staff had the harder work to perform. The task which devolved on General Werder was thoroughly well executed, under circumstances which were in the highest degree trying.

A close and careful study of the book, which is well provided with plans and maps, will well repay the military student.

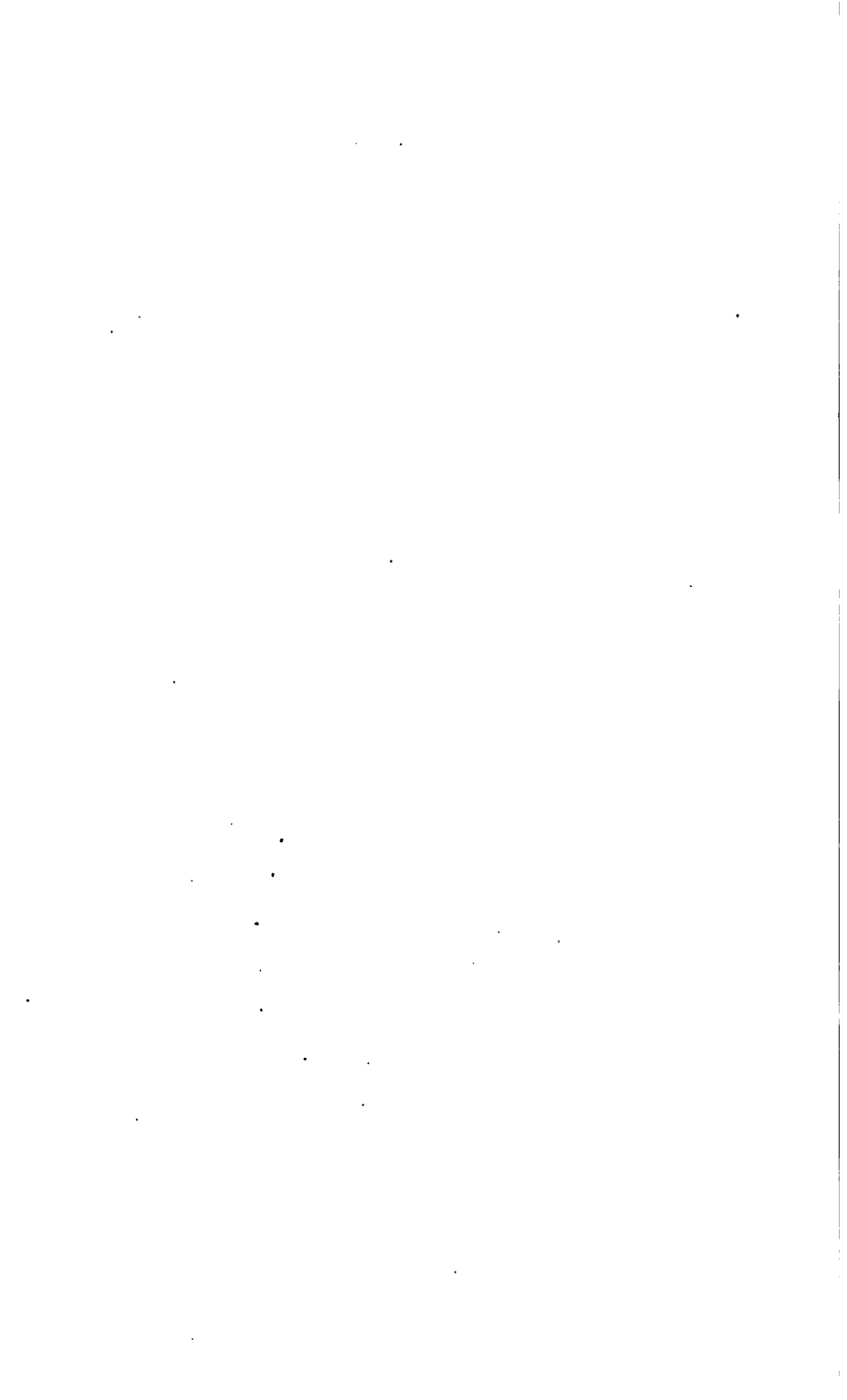
INDEX
OF
THE LECTURES AND PAPERS
CONTAINED IN
VOLS. XI.—XX.
OF
The Journal
OF THE
Royal United Service Institution,
AND ALSO OF
THE NAMES OF THEIR AUTHORS.



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INDEX OF SUBJECTS.

SUBJECT OF LECTURE OR PAPER.	NAME OF AUTHOR.	Vol., No., and Page of Journal.	Year.
		Vol. No. P.	
A.			
ABYSSINIA	Parkyns, Mansfield	XII 51 506	1868
"ACHILLES," H.M.S., Inglefield's New Hydraulic Steering Apparatus, as being fitted to, <i>with plate</i>	Inglefield, E. A., Captain R.N.	XIII 53 22	1869
— Means of Screw-Ship Steering, and a Description of the Hydrostatic Steering Gear fitted on board, with the Results of Experiments at Sea; also a Plan of Apparatus fitted on board the Turkish Ironclad "Fethi-Bulend," <i>with plate</i>	„ E. A., Rear-Admiral	XIV 57 52	1870
AFRICA, The Best Mode of Defence of the Protected Territories on the Gold Coast of, and the Organization of a Force Sufficient for that Purpose, <i>with map</i>	Lauderdale, Adm. the Earl of, G.C.B.	XVII 74 676	1873
"AGINCOURT," H.M. Ship, on and off the Pearl Rock, <i>with plates</i>	Boyle, R. H., Commander R.N.	XVI 67 180	1872
AIKMAN'S Instruction-Rifle and Practice-Tester for Ordnance, <i>with plate</i>	Aikman, F. R., Lt.-Col., E.C.	XV 65A 847	1871
AMBULANCES, A Visit to Some of the, and Battle Fields of the North of France	Moust, F. J., Surgeon-Maj., M.D.	XV 64 459	1871
AMERICAN Navy, its Organization, Ships, Armament, and Recent Experiences, <i>with plates</i>	Hamilton, J. Randolph	XII 49 243	1868
AMMUNITION-Supply Car, Skeleton Ammunition Car, Packing Ammunition, &c., <i>with plates</i>	Martin, T., Lieut.-Col. (late 4th Regiment)	XIII 55 337	1869
ANCIENT Naval Tactics, <i>with plates</i> ..	Warre, the Rev. Edmond, M.A.	XX 88 593	1876
ANEROID Barometer, An Occasional Note on the Use of, in Surveying	Fawcett, R. H., Capt. 33rd Regt.	XVI 66 143	1872

SUBJECT OF LECTURE OR PAPER.	NAME OF AUTHOR.	Vol., No., and Page of Journal.	Year.
ANIMALS, Minute Sea Surface, Delineation of some (Coloured Drawings), Part I.	Toynbee, Mrs. ..	Vol. No. P. XIX 80 214	1875
———— " " " II.	" "	XIX 81 377	1875
———— " " " III.	" "	XIX 82 531	1875
———— " " " IV.	" "	XIX 83 657	1875
APPARATUS for automatically Recording the Rolling of a ship in a Sea-way, <i>see Rolling.</i>			
APPENDICES.*			
ARMADA, Spanish, A Warning Voice from..	Collinson, T. B. Maj.-Gen. R.E.	XIX 81 285	1875
ARMED Strength of Europe.. ..	Vincent, C. E. H., Lieut. 23rd Royal Welsh Fusiliers	XIX 83 549	1875
ARMIES, Foreign, the Practical Instruction of Staff Officers in	Burnaby, F. G., Capt. Roy. Horse Guards	XVI 68 633	1872
———— of different Nations, the Comparative Cost of, and the loss to a Country by Conscription	Ardagh, J. C., Capt. R.E.	XX 86 218	1876
ARMOUR-CLADS, Firing at, reduced to a System, <i>with plate</i>	Orde-Browne, C., Capt. late R.A.	XVI 69 684	1872
ARMOUR (Deflecting) Plated Ships for Coast Defence, <i>with plate</i>	Hyde, J. M. ..	XIII 53 128	1869
ARMoured Turret Ships, The Conversion of our Screw Line of Battle Ships into, <i>with plates</i>	Henwood, Charles F.	XIII 54 181	1869
ARMOUR-PLATED Ship, Description of a Model of, designed by him, <i>with illustrations</i>	Wilson, Edmund, Capt. R.N.	XII 51 502	1868
ARMS of Precision, New, The Amount of Advantage they give to the Defence over the Attack	Schaw, H., Capt. R.E.	XIV 59 377	1870
———— of Precision, How far the Employment of Cavalry is Affected by Recent Improvements in	Smith, Michael W., Maj.-Gen., C.B.	XII 49 147	1868

* To each Volume of the Journal, there is a General Meeting, Additions to the Index.—Ed.

containing the Proceedings of every second year.

SUBJECT OF LECTURE OR PAPER.	NAME OF AUTHOR.	Vol., No., and Page of Journal.	Year.
ARMS, Small, Breech-Loading, the Progress of, <i>with plates</i>	Latham, John ..	Vol. No. P. XIX 83 631	1875
—— Small, Breech-Loading, Cartridges for, and the Best Form of Projectile, <i>with plate</i>	O'Hea, J. B., Capt. late 25th Regt.	XII 48 105	1868
—— Small, Military Breech-Loading, <i>with plate</i>	Majendie, V. D., Capt. R.A.	XI 44 190	1867
ARMY Administration, Reforms in.. ..	De Fonblanque, H. B., Dep. C.-G.	XIII 53 88	1869
—— a Proposition for one General Military School for	Collinson, Col. T. Bernard, R.E.	XIII 54 241	1869
—— British, The Cultivation of Scientific Knowledge by Regimental Officers of	Ross, Major W.H., late R.A.	XVI 69 774	1872
—— Chinese, The Economy of, <i>with illustrations</i>	Lamprey, J., M.B., Surgeon 67th Regiment	XI 46 403	1867
—— Construction of Boots and Shoes Suitable for the, Police, and others subject to Severe Walking, <i>with plate</i>	Howlett, Samuel B.	XII 48 44	1868
—— German, The Medical Department of, in Peace and War	Fox, T. W., Surgeon-Gen. R.E.	XX 87 560	1876
—— Night Telegraph—The Spakowsky Marine	Doty, H. H., Capt.	XI 47 658	1867
—— of England, an Organization for ..	Bevan - Edwards, G., Major R.E.	XII 50 295	1868
—— On the Best Practical Method for Ensuring Efficiency in, and for Obtaining an Effective and Reliable Reserve, having Regard to the Existing Feeling in the Country on the Subject	Warde, Sir Edward C., K.C., Major-General, R.A.	XIX 80 128	1875
—— On the Organization of the Communications of, including Railways	Home, Lieut.-Col., C.B., R.E.	XIX 82 381	1875
—— Organization: our Infantry Forces and Infantry Reserves	Leahy, Arthur, Major R.E.	XII 50 310	1868
—— Suggestions for the Land Transport Service	Beazley, G. G., Capt. 83rd Regt.	XIII 56 564	1869
ARMY, the, The Best Mode for Recruiting for, and the Influences bearing upon that Service	Noake, R.C., Capt. Adjutant Scottish Borderers Militia	XI 43 27	1867

SUBJECT OF LECTURE OR PAPER.	NAME OF AUTHOR.	Vol., No., and Page of Journal.	Year.
ARMY, the, The Dress and Equipment of, <i>with plate</i>	Walker, Arthur, Capt.	Vol. No. P. XI 45 375	1867
—— The Education of, with Reference to Young Officers	Middleton, F. D., Lt.-Col.	XV 65 686	1871
—— The Italian, <i>with plan</i>	Waveney, Col. Lord,	XX 86 359	1876
—— The Russian	Vincent, C. E. H., Lieut. 23rd Royal Welsh Fusiliers	XVI 57 285	1872
—— Prussian, A Brief Sketch of the System of Officering	„ „	XVI 69 796	1872
—— The Austrian.	„ „	XVII 73 827	1873
—— The Study of Military History by the Regimental Officers of, <i>with map and plates</i>	Hale, Lonsdale A., Maj. R.E.	XX 87 508	1876
ARTILLERY and Troops, Moveable Steel Mantlet for the Protection of, <i>with plate</i>	Eddy, Charles B., M.A.	XIII 55 326	1869
—— Field, on the Connected System, <i>with plate</i>	Ross, W. H., Maj. R.A.	XII 48 72	1868
—— Fire in Peace Manœuvres, <i>with diagrams</i>	Carmichael, L. M., Capt. 5th Royal Irish Lancers	XVIII 78 449	1874
—— Modern, as exhibited at Paris in 1867, <i>with plates</i>	Owen, C. H., Lieut.-Col. R.A.	XII 48 90	1868
—— of the Advanced Guard of an Army in the Field, the Constitution and Duties of—(The R. A. Institution Prize Essay of 1874)	Pratt, S. C., Lieut. R.A.	XVIII 79 489	1874
—— Practical, <i>with plates</i>	Strange, T. B., Capt. R.A.	XV 63 119	1871
—— Practice, Expanding Sponge for, <i>with plate</i>	Gilmore, A. H., Lieut. R.N.	XIII 53 30	1869
—— The Modes of Determining the Accuracy of, <i>with diagrams</i>	Pole, Professor W.	XI 43 1	1867
—— the Tactical Power of Modern Field	Brackenbury, C. B., Lt.-Col. R.A.	XX 86 310	1876
ASHANTER Campaign—H.M.S. "Victor Emanuel" as an Hospital Ship during the late, <i>with plate</i>	Ryder, A. P., Vice-Admiral	XVIII 78 363	1874

SUBJECT OF LECTURE OR PAPER.	NAME OF AUTHOR.	Vol., No., and Page of Journal.	Year.
ASHANTI Campaign, The Volta Expedition, <i>with map</i>	Glover, Sir John H., G.C.M.G., Capt. R.N.	Vol. No. P. XVIII 78 317	1874
—— Expedition of 1873	Wood, Evelyn, Col., G.C., C.B., 90th Regiment	XVIII 78 331	1874
ASIA in Europe, and a Sketch of the Russo-Turkish Campaigns of 1828-29, <i>with maps</i>	Wilbraham, Sir Richard, Lieut.-General, K.C.B.	XX 88 692	1876
—— Central, The Strategy of Russia in, from a Persian Point of View, <i>with map</i>	Smith, B. Murdoch, Capt. R.E.	XVII 71 212	1873
ASIAN (Central) Question, <i>with map</i> ..	Trench, F. Chenevix, Capt. 20th Hussars	XVII 71 184	1873
ATLANTIC, The Winds of the North, <i>with plates</i>	Toynbee, H., Capt.	XV 64 567	1871
—— The Meteorology, Sea Temperature, and Currents of the 10° square of the, which lies between the Equator and 10° N., and from 20° to 30° W., <i>with plates</i>	„ „	XVII 72 331	1873
ATTACK in Skirmishing Line, Proposed Method of, <i>with diagrams</i>	Parker, F. G. S. Capt. 54th Regt.	XVII 74 741	1873
—— Proposed Formation of a Battalion for the, <i>with plate</i>	Bigge, T. S., Major 5th Fusiliers	XVIII 76 152	1874
AUSTRIAN Army	Vincent C. E. H. Lt. 23 R.W.F.	XVII 73 527	1873
—— in 1875	Graham, Sir Lumley, Bart., Col.	XX 87 543	1876
—— Confidential Report, and New Method of Promotion	Vincent, C. E. H., Lieut. 23rd Royal Welsh Fusiliers	XVI 66 151	1872
AUTUMN Manœuvres of Continental Armies, Military Maxims Suggested or Exemplified by the last, <i>with plans</i>	Shute, C. Cameron, Col., C.B.	XIV 53 206	1870
—— Manœuvres abroad and at home ..	Codrington, Sir William J., General G.C.B.	XVI 68 497	1872
—— Manœuvres of England	Brackenbury, C. B., Capt. R.A.	XVI 67 222	1872

SUBJECT OF LECTURE OR PAPER.	NAME OF AUTHOR.	Vol., No., and Page of Journal.	Year.
AUTUMN Manœuvres of 1872	Brackenbury, C.B., Capt. R.A.	Vol. No. P. XVII 71 73	1873
——— Manœuvres of the Prussian Guard Corps in September, 1872, <i>with plates</i>	Hildyard, H., Lieut. 72nd High-landers	XVI 69 781	1872
AZIMUTH Tables, Croudace's New Book of Stellar, and a Newly-Invented Illuminated Stellar Azimuth Compass, Croudace's Ordnance Night-Sight Vane or Collimator	Croudace, W. S.	XVIII 77 265	1874
B.			
BARBETTE System, Further Particulars regarding Moncrieff's Protected, <i>with plates</i>	Moncrieff, A., Capt. Edinburgh Artillery Militia	XI 44 241	1867
BAROMETRE, Aneroid, An Occasional Note on the Use of, in Surveying	Fawcett, R. H., Capt. 33rd Regt.	XVI 66 143	1872
BARRACKS, Suggested Improvements in Sanitary Arrangements of Hospitals, Camps, and Shipping, &c.	Synge, Millington, Major-Gen. R.E.	XVIII 78 299	1874
BATTLE of Königgratz, <i>with maps</i>	Walker, Beau- champ, Col., C.B.	XII 51 440	1868
——— of Worth	Collen, E. H. H., Lt. R.A.	XVII 73 426	1873
BED or Mattraas, Life-Saving	Smith, Henry ..	XIII 54 216	1869
BEDSTEAD, The Chobham, <i>with illustration</i>	Dillon, Conrad A., Capt.	XVI 66 56	1872
BESSEMER Saloon, A Proposed Method of Mounting Heavy Ordnance at Sea on the Principle of	Strange, Alex., Lt.- Col.	XVII 75 836	1873
BINNACLE Lights, Nunn's Improved, <i>with plate</i>	Colomb, P. H., Comr. R.N.	XII 49 272	1868
BISCUIT and other Farinaceous Articles of Diet in H.M. Navy, The Preservation of, from Weevil, Maggots, and other Insects, <i>with illustrations</i>	Seccombe, E.	XIX 83 681	1875
BOAT Lowering and Self-Detaching Apparatus, Hill's, <i>with plate</i>	Hill, E. J. ..	XVI 69 762	1872
'OATS, Lowering, at Sea, <i>with plate</i> ..	Lacon, W. Stirling	XVII 71 97	1873
—— Quarter, Plan of Sustaining and Lowering Ships', <i>with plates</i>	Simpson, C. H., Capt. R.N.	XI 47 519	1867

SUBJECT OF LECTURE OR PAPER.	NAME OF AUTHOR.	Vol., No., and Page of Journal.	Year.
BOATS, On Improvements in Apparatus for Lowering and Raising, Engaging and Disengaging Ships', <i>with plate</i>	Folkard, A., M.I.C.E.	Vol. No. P. XVIII 77 278	1874
BOLTON and Colomb's Signal Lights, <i>with illustrations</i>	Colomb, P. H., Comr. R.N.	XII 50 373	1868
BOOT, Military, Parker-Rhode's	Parker-Rhodes, C. E.	XVI 69 764	1872
BOOTS and Shoes Suitable for the Army, Police, and others subject to Severe Walking, Construction of	Howlett, Samuel B.	XII 48 44	1868
BOW and Stern Screw Steamships, <i>with diagram</i>	Griffiths, R., C.E.	XVII 74 784	1873
BOYS—On Training them for Soldiers ..	Macgregor, John, M.A.	XIX 82 399	1875
BREECH-LOADERS, with Reference to Calibre, Supply, and Cost of Ammunition, <i>with plate</i>	Selwyn, J.H., Capt. R.N.	XI 43 15	1867
BREECH-LOADING and Muzzle-Loading for Guns, <i>with illustrations</i>	Morgan, J. P., Major R. A.	XVIII 78 408	1874
—— Cannon, Stuart's, <i>with plate</i> ..	Stuart, Graham, Capt. 4th W. Y. Artil. Volunteers	XIV 57 19	1870
—— Gun, Heavy, A Proposal for one of Novel Construction, <i>with plates</i>	Morgan, J.P., Capt. R.A.	XIV 60 479	1870
—— Small Arms, Cartridges for, and the best form of Projectile, <i>with plate</i>	O'Hea, J.B., Capt. late 25th Regt.	XII 48 105	1868
—— Small Arms, Military, <i>with plates</i>	Majendie, V. D., Capt. R.A.	XI 44 190	1867
—— Small Arms, The Progress of, <i>with plate</i>	Latham, John,	XIX 83 681	1875
BREMNER'S Steam Steering Screw, <i>with illustration</i>	Bremner, Geo., Capt.	XVII 70 69	1873
BRIDGE (Military) Construction, <i>with plates</i>	Leahy, Arthur, Lieut.-Col. R.E.	XIX 84 689	1875
BROADSIDE and End-on System, Combined, <i>with plates</i>	Symonds, T. E., Capt. R.N.	XI 46 485	1867
—— System, The Turret <i>versus</i> the, <i>with plates</i>	Coles, Cowper P., Capt. R.N., C.B.	XI 46 484	1867

SUBJECT OF LECTURE OR PAPER.	NAME OF AUTHOR.	Vol., No., and Page of Journal.	Year.
BROADSIDE, Working Heavy Guns on the, with some Observations on the All-Round Fire, combined with the Broad-side System of Armament, <i>with plate</i>	Wilson, Edmund, Capt. R.N.	Vol. No. P. XIII 53 110	1869
"BRUTSER," H.M.S., On the Casing of the Propeller of, <i>with plate</i>	Griffiths, R., C.E.	XX 86 171	1876
BULLETS, Explosive, and their Application to Military purposes, <i>with plate</i>	Fosbery, G. V., Maj. G. C., H.M. Bengal Staff Corps	XII 43 16	1868
BURMAH, Upper, its Defences and War-like Resources, <i>with map</i>	Browne, Edmond, Capt. 21st Royal N. B. Fus.	XIX 83 588	1875
C.			
CABLES, the Atlantic Telegraph of 1857-58, also those of 1865-66	Moriarty, H. A., Staff-Commander, C.B., R.N.	XI 44 127	1867
CAITHNESS'S, the Earl of, Gravitating Compass, and Nunn's Improved Binnacle Lights, <i>with illustration</i>	Colomb, P. H., Comm. R.N.	XII 49 272	1868
CAMPAIGN of 1870-71, &c.—(Notice of Work)	Lohlein, Ludwig, late Captain 1st Baden Body Guard Grenadier Regt.	XX 88 762	1876
—— Manteuffel's, in the East of France, <i>with map</i>	Gun, H. A., Capt. R.E.	XVII 72 268	1873
CAMPAIGNS of 1828-29 in Europe and Asia, a Sketch of the Russo-Turkish, <i>with maps</i>	Wilbraham, Sir Richard, Lieut.-General, K.C.B.	XX 88 692	1876
CAMPAIGN (The Last), of Hanover, <i>with maps</i>	Brackenbury, H., Capt. R.A.	XIV 58 255	1870
—— the late Russian, against Khiva, <i>with map</i>	Trench, F. Chenevix, 20th Huss.	XVIII 77 212	1874
—— The Umbeys, <i>with plate</i>	Fosbery, G. V., Major, G. C., H.M. Bengal Staff Corps	XI 47 548	1867
—— (The Winter) of Le Mans, <i>with maps</i>	Brackenbury, C.B., Capt. R.A.	XV 64 380	1871
CAMPBELL'S Range-Indicator, <i>with plate</i> ..	Campbell, J. R., Capt. Hants Militia Artillery	XVI 67 309	1873

SUBJECT OF LECTURE OR PAPER.	NAME OF AUTHOR.	Vol., No., and Page of Journal.	Year.
CAMPBELL'S Range-Indicator. ERRATUM ditto ditto	Campbell, J. E., Capt. Hants Militia Artillery	Vol. No. P. XVI 68 644	1872
CAMPING and Moving of Troops in Tropical Regions,—Sanitary Precautions to be observed, &c.	Maclean, W. C., M.D., C.B., Surgeon-General	XVIII 76 114	1874
CANADA, Dominion of, Report of a Reconnaissance of the North-West Provinces and Indian Territories of, and Narrative of a Journey Across the Continent through Canadian Territory to British Columbia and Vancouver's Island, <i>with map</i>	Robertson - Ross, P., Colonel	XVII 74 548	1873
CANNON, Stuart's Breech-Loading, <i>with plate</i>	Stuart, Graham, Capt. 4th W. Y. Artil. Volunteers	XIV 57 19	1870
"CAPTAIN," On the Causes of the Insufficient Stability of H. M.'s late Turret Ship, and of other Ironclads, <i>with plates</i>	Fishbourne, E. Gardiner, Rear-Admiral, C.B.	XV 62 1	1871
CARTRIDGES for Breech-Loading Small Arms, and the Best Form of Projectile, <i>with plate</i>	O'Hea, J.B., Capt., late 25th Regt.	XII 48 105	1868
CAUCASUS, The Eastern, and Daghestan, <i>with map</i>	Cunryngame, Sir A., Gen., K.C.B.	XVII 75 749	1873
CAVALRY—How far its Employment is Affected by Recent Improvements in Arms of Precision	Smith, Michael W., Maj.-Gen. C.B.	XII 49 147	1868
—— Organization and Employment of, <i>with Discussion on ditto</i>	Baker, Valentine, Col., late 10th Hussars	XVII 73 375	1873
—— Regiments about to take part in the Exercises of the Combined Cavalry Division Detailed from Regiments, translated by Major-General Walker, C.B., Instructions for — (Notice of Book)	Von Schmidt, Maj.-Gen., translated by Maj.-Gen. B. Walker, C.B.	XX 86 422	1876
—— the Employment of, in War	Hezier, H. M., Capt.	XVI 67 168	1872
—— <i>with plates</i>	Russell, Frank S., Major 14th Hun.	XX 86 179	1876
CENTRAL Asian Question—The Euphrates Valley Route to India, in connection with, <i>with map</i>	Andrew, W. P.	XVII 73 472	1873

SUBJECT OF LECTURE OR PAPER.	NAME OF AUTHOR.	Vol., No., and Page of Journal.	Year.
CENTRAL Asian Question, The, <i>with map</i> ..	Trench, F. Chenevix, Capt. 20th Huss.	Vol. No. P. XVII 71 184	1873
— Asia, the Military Geography of, <i>with maps</i>	Baker, Valentine, Col., late 10th Hussars	XVIII 79 463	1874
— Asia, the Strategy of Russia in, from a Persian Point of View, <i>with map</i>	Smith, R. Murdoch, Capt. R.E.	XVII 71 212	1873
"CHALLENGER," H.M.S., The Voyage of, <i>with map and diagrams</i>	Carpenter, William, M.D.	XVII 75 813	1873
"CHALLENGER," H.M.S., The Voyage of, continued, <i>with diagrams</i>	" "	XIX 84 741	1875
— The, Extracts from a Paper read at the British Association for the Advancement of Science, at Bradford, on the Scientific Voyage of, <i>with map</i>	Davis, J. E., Capt. R.N.	XVII 75 828	1873
CHINESE Army, the Economy of, <i>with illustrations</i>	Lamprey, J., M.B., F.R.G.S., Surgeon 67th Regiment	XI 46 403	1867
— Naval Arsenal at Foo-chow, an Account of, translated and abridged from M. Giquel's Pamphlet	Bridge, Cyprian A. G., Comr. R.N.	XX 88 711	1876
CHITTAGONG Column of the Lushaie Expeditionary Force, 1871-72, an Account of the Proceedings of, <i>with map</i>	East, C. J., Brevet-Major 41st Regt.	XVII 71 113	1873
— Torpedo, Description of a Model of	Beal, Rev. S., R.N.	XV 65 723	1871
CIRCULAR Ironclads, <i>with plates</i>	Reed, E. J., C.B., M.P.	XX 85 85	1876
— Ships of War, <i>see Ships of War.</i>			
COAL, Economy of, as viewed by the Commander of a Steam Vessel	Shortland, P. F., Capt. R.N.	XVIII 76 2	1874
COALS, Methods of ascertaining the Relative Value of, for Naval Purposes, <i>with illustrations</i>	Eckersley, E., Chief Engineer, R.N.	XIX 84 723	1875
COAST Defences, and the Application of Iron to Fortifications, <i>with plate</i>	Jervois, Col., C.B., R.E.	XII 52 548	1868
— Fog Signals, <i>see Fog Signals.</i>			

SUBJECT OF LECTURE OR PAPER.	NAME OF AUTHOR.	Vol., No., and Page of Journal.	Year.
COAST Defence, Deflecting Armour-Plated Ships for, <i>with plate</i>	Hyde, J. M. ..	Vol. No. P. XIII 53 123	1869
COLLIMATOR, The Use of, for Laying Guns for Night Firing, <i>with plate</i>	Davidson, D., Lieut.-Col.	XIII 55 386	1869
COLLISION, &c., in Cases of, The Naval Hammock, its Buoyancy and Use in Saving Life at Sea	Ryder, A.P., Rear-Admiral	XV 62 111	1871
COLLISIONS at Sea, Helm Indicator for the Prevention of, <i>with illustrations</i>	Read, George, R.N.	XII 48 141	1868
—— Read and Nicholl's Patent Day and Night Helm Signals for Preventing, <i>with plate</i>	„ „	XVI 69 749	1872
—— On the best Method of Propelling Steam Ships, so as to give the Greatest Facility for Manœuvring in Action, and for Avoiding Collisions, <i>with plate</i>	Griffiths, R., C.E.	XX 88 684	1876
COLOMB, Captain, Signal Lights of, and of Captain Bolton, <i>with plate</i>	Colomb, P. H., Comr. R.N.	XII 50 373	1868
COMMISSION, Permanent, the Necessity for, on State Scientific Questions	Strange, Alex., Lt.-Col.	XV 64 537	1871
COMPANY, The, as a Military Body; its Establishment, and the Best Number of Companies in the Battalion	Graham, Sir Lumley, Bart., Col.	XIX 83 567	1875
COMPASS, Description of a Registering, <i>with illustration</i>	Arthur, Capt., R.N.	XIV 61 567	1870
COMPASSES, The Demagnetization of Iron Ships and of Iron Beams, &c., of Wooden Vessels, to prevent the Deviation of, Experimentally shown by means of a Model, <i>with plate</i>	Hopkins, Evan, C.E.	XI 44 260	1867
CONICAL Screw and Breech-Loading Cannon, Steenstrûp's, <i>with illustration</i>	Jensen, Peter	XIV 57 124	1870
CONSCRIPTION, Universal, the only Answer to the Recruiting Question.—(The Institution's Military Prize Essay, 1875)	Hime, H. W. L., Capt. R.A.	XIX 80 92	1875
CONTROL Service, The, with Practical Suggestions for its Improvement, &c.	De Fonblanque, E. B., Dep. C.-G.	XVI 66 106	1872
CONVENTION, The Geneva, of 1864, in Relation to aid afforded by Volunteer Societies to Sick and Wounded Soldiers during the late Franco-Prussian War, &c.	Longmore, T., C.B., M.D., Dep. Insp.-Gen. Hospitals	XVI 67 206	1872

SUBJECT OF LECTURE OR PAPER.	NAME OF AUTHOR.	Vol., No., and Page of Journal.	Year.
COOKING Apparatus, Self-Acting, Sørensen's Norwegian, <i>with illustrations</i>	Sørensen, John. ..	Vol. No. P. XII 42 292	1868
—— for Troops, <i>with illustrations</i> ..	Warren, J. Frederick, Comr. R.N.	XII 42 275	1868
COST, Comparative, of the Armies of different Nations, and the loss to a Country by Conscription	Ardagh, J. C., Capt. R.E.	XX 86 218	1876
CROUDACE'S New Book of Stellar Azimuth Tables, and on a Newly-Invented Illuminated Stellar Azimuth Compass, Croudace's Ordnance Night-sight Vane or Collimator	Croudace, W. S.	XVIII 77 255	1874
CURRENTS, Ocean	Laughton, J. K., R.N.	XV 65 663	1871
—— Ocean, and their Influences, <i>with maps</i>	Findlay, A. G.	XIV 58 183	1870
D.			
DAGHESTAN and the Eastern Caucasus, <i>with map</i>	Cunynghame, Sir A., Gen., K.C.B.	XVII 75 749	1873
DECK-RAFTS for Saving Life at Sea, and a System of Improved Life-Buoys, <i>with illustration</i>	Hamilton, Mark, M.D., Surgeon R.N.	XVII 74 725	1873
DEFENCE, Harbour	Moncrieff, Alexander, Major	XIX 81 357	1875
—— Maritime, of England, including Offensive and Defensive Warfare:— Part I. The Organization of our Maritime Forces. Part II. Our Ships of War and their Armament, &c., <i>with plates</i>	Scott, R. A. E., Capt. R.N.	XX 87 447	1876
—— of England, Observation on the ..	Soady, F. J., Lieut.-Col. R.A.	XIV 61 570	1870
—— of Paris, The New Works for, <i>with map</i>	Tyler, E. S., Major R.E.	XIX 80 74	1875
DEFENCES, Coast, and the Application of Iron to Fortifications, <i>with plates</i>	Jervois, Col., C.B., R.E.	XII 52 540	1868
DEFENCES, National, of Great Britain, Especially with Reference to the Future Requirement of Floating Forts, <i>with plate</i>	Mackie, Samuel J., Assoc. Inst. C.E.	XII 49 222	1868

SUBJECT OF LECTURE OR PAPER.	NAME OF AUTHOR.	Vol., No., and Page of Journal.	Year.
DEFENCE, The Amount of Advantage which the new Arms of Precision give to the, over the Attack	Schaw, H., Capt. R.E.	Vol. No. P. XIV 59 377	1870
— The Position and Lines of the 5th Corps before Versailles during the Winter of 1870-71, <i>with map</i>	Walker, Beauchamp, Maj.-Gen., Mil. Attaché, Berlin	xv 65 806	1871
DEFENSIVE Submarine Warfare, <i>with plate</i>	Stotherd, R. H., Major R.E.	xv 65 705	1871
DEFLECTING Armour-Plated Ships for Coast Defence, <i>with plate</i>	Hyde, J. M. ..	xiii 53 128	1869
DEMAGNETIZATION of Iron Ships and of Iron Beams, &c., of Wooden Vessels, to Prevent the Deviation of the Compasses, experimentally shown by means of a Model, <i>with plate</i>	Hopkins, Evan, C.E., F.G.S.	xi 44 260	1867
DISEMBARKATIONS (Lecture to Officers of Volunteers)	Knollys, W. W., Maj. 93rd Highlrs.	Special } No. } p. 47	1873
DISTRIBUTION, The, of our War Forces, <i>with map</i>	Colomb, J. C. R., Captain Royal Marine Artillery	xiii 53 37	1869
DIVING Apparatus, Propositions in connection with, <i>with plate</i>	Bucknill, J. T., Lieut. R.E.	xv 65A 860	1871
DOVER Bay, the Proposed Enclosure of; Review of Designs, and Historical Essay on the Harbour, <i>with plates</i>	Redman, J. Baldry.	xix 83 659	1875
DRESS and Equipment of the Army, <i>with plate</i>	Walker, Arthur, Capt.	xi 45 375	1867
DRILL Book, Infantry, The Latest Changes made by the Prussians in their	Jones, E. M., Major 20th Regiment	xvi 68 527	1872
— Prussian, 1876	Newdigate, E., Col.	xx 88 719	1876
DYER, Captain, a Few Notes on His Paper	Nicolson, Sir Fred. W.E., Bart., C.B., Vice-Admiral	xviii 77 290	1874
E.			
EASTERN Question, The Military Aspects of the, and the Turkish Forces	Vincent, C. E. H., Lieut.-Col.	xx 86 346	1876
ECONOMY of Coal, as viewed by the Commander of a Steam Vessel	Shortland, P. F., Capt. R.N.	xviii 76 2	1874
ECONOMY of Fuel, comprising Mineral Oils	Rankine, Professor W. J. Macquorn	xi 44 218	1867

SUBJECT OF LECTURE OR PAPER.	NAME OF AUTHOR.	Vol., No., and Page of Journal.	Year.
ECONOMY of Fuel in Ships of War, <i>see Fuel.</i>		Vol. No. P.	
EDUCATION and Professional Instruction of Officers	Tulloch, Alexander B., Captain 69th Regiment	XVII 75 759	1873
EDUCATION of Staff Officers.. ..	Jones, Alfred S., Major, <i>W.C.</i>	XIV 59 271	1870
EDUCATION of the Army, with Reference to Young Officers	Middleton, F. D., Lt.-Col.	XV 65 686	1871
EDUCATION, (Preliminary), of Naval Officers	Goodenough, J. G., Capt. R.N.	XV 64 338	1871
EDUCATION, the Higher, of ditto	Ryder, A. P., Rear-Admiral	XV 65 734	1871
ELECTRIC - (MAGNETO) Light, <i>with illustrations</i>	Abney, W. de W., Capt. R.E.	XX 86 332	1876
ELEVATING Gun Platform, <i>with illustration</i>	Stone, C. P., Lieut. 77th Regiment	XIII 53 84	1869
END-ON and Broadside, Combined System, <i>with plates</i>	Symonds, T. E., Capt. R.N.	XI 46 485	1867
ENGINEERING, Field, Illustrated by some of the Operations of the German Engineers during the War of 1870-71, <i>with maps</i>	Schaw, H., Lt.-Col. R.E.	XVIII 76 18	1874
ENGINES, Simple and Compound, the Comparative Merits of, <i>with plates</i>	Rennie, G. B., M.I.C.E.	XIX 80 199	1875
ENGLAND, Observation on the Defence of ..	Soady, F. J., Lieut.-Colonel R.A.	XIV 61 570	1870
—— The Government Breech-Loading Rifles of, and of France and Prussia, <i>with plate</i>	Drake, Mervin, Capt. R.E.	XV 64 438	1871
—— the Royal Navy of	Anonymous ..	XX 86 419	1876
—— The Maritime Defence of, including Offensive and Defensive Warfare:—Part I. The Organization of our Maritime Forces. Part II. Our Ships of War, their Armament, &c., <i>with plates</i>	Scott, R. A. E., Capt. R.N.	XX 87 447	1876
ENGLISH and Foreign Maps, and their Use for Military Purposes	Wilson, C. W., Capt. R.E.	XVI 67 245	1873

SUBJECT OF LECTURE OR PAPER.	NAME OF AUTHOR.	Vol., No., and Page of Journal.	Year.
ENTRENCHING Tools, New Arrangement for, with a Method of Converting the Regulation Bell Tent into a Shelter Tent, <i>with illustrations</i>	James, Wm., late 42nd Highlanders	Vol. No. P. XVI 67 183	1872
ESSAY (The Institution's Military Prize, 1875).—Universal Conscription, the only Answer to the Recruiting Question	Hime, H. W. L., Capt. R.A.	xix 80 92	1875
— (The Naval Prize, 1876).—The Best Types of War Vessels for the British Navy, <i>with plates</i>	Noel, G. N. U., Comr. R.N.	xx 86 253	1876
— (The R.A. Institution Prize of 1874).—The Constitution and Duties of the Artillery of the Advanced Guard of an Army in the Field	Pratt, S.C., Lieut. R.A.	xviii 79 489	1874
EUPHRATES Valley Route to India, in connection with the Central Asian Question, <i>with map</i>	Andrew, W. P. . .	xvii 73 472	1873
EUROPE, The Armed Strength of	Vincent, C. E. H., Lieut. 23rd Royal Welsh Fusiliers	xix 83 549	1875
EXERCISES, Gymnastic, The Military and Naval Force derivable from the Introduction of Military Drill, as part of a National System of Education, into all Elementary Schools	Chadwick, Edwin, C.B.	xiv 59 287	1870
EXPEDITION, Ashanti, of 1873	Wood, Evelyn, Col. G.C., C.B., 90th Regt.	xviii 78 331	1874
— The Red River, <i>with maps</i>	Huyshe, G. L., Capt. Rifle Brig.	xv 62 70	1871
EXTRACTS from the four last Chapters of Admiral Jurien de la Gravière's Work	Ryder, A.P., Rear-Admiral	xvii 72 250	1873
EXPLOSIVE Agents applicable to Naval and Military Purposes as Substitutes for Gunpowder	Abel, F.A., F.R.S.	xvi 68 457	1872
— Bullets and their, Application to Military Purposes, <i>with plates</i>	Fosbery, G. V., Major, G.C., H. M. Bengal Staff Corps	xii 48 16	1868
EXPLOSIVES, Fog Signalling by, <i>with plates</i>	Maitland, E., Maj. R.A.	xix 82 481	1875

SUBJECT OF LECTURE OR PAPER.	NAME OF AUTHOR.	Vol. No. and Page of Journal.	Year.
EXPLOSIVE Force of Gunpowder, The Determination of, <i>with plates</i>	Morgan, J. P., Capt. R.A.	Vol. No. P. XV 64 312	1871
EXPERIMENTS at Shoeburyness during the year 1868-69, Summary of	Mackie, Samuel, J.	XIII 55 303	1869
EYE-Training, Target for	Poore, F.H., Capt. R.M.A.	XVII 72 309	1873
F.			
FIELD Artillery on the Connected System, <i>with plate</i>	Ross, W.H., Major R.A.	XII 48 72	1868
——— Engineering, <i>see Engineering.</i>			
——— Railways, <i>see Railways.</i>			
FILTER, Description of a New	Lord, W.B. (h.p.), R.A.	XII 51 503	1868
FIRING, Accurate, of Naval Ordnance by means of the Vessel's Motion, <i>with plates</i>	Bessemer, H. ..	XVII 75 888	1873
——— at Armour Clads reduced to a System, <i>with plate and illustration</i>	Orde-Browne, C., Capt. late R.A.	XVI 69 684	1872
FLEET-EVOLUTIONS and Naval Tactics ..	Bridge, Cyprian A. G., Comr. R.N.	XVII 72 227	1873
FLEET-MANŒUVRING, <i>with plates</i>	Pellew, Pownoll W., Comr. R.N.	XI 47 527	1867
FLEETS, Fog-Signals in	Brent, H. W., Comr. R.N.	XV 63 136	1871
——— The Attack and Defence of, Part I., <i>with plates</i>	Colomb, P. H., Capt. R.N.	XV 64 405	1871
Ditto ditto Part II., <i>with illustrations</i>	„ „	XVI 66 1	1872
FLOATING Forts, <i>see Defences.</i>			
FOG-SIGNALS, Coast	Boazley, Alex. ..	XVI 69 645	1872
——— for Vessels under Weigh, <i>with illustrations</i>	Richards, J. C., Staff Commander R.N.	XIX 82 491	1875
——— Some Account of the Observations recently made by the Corporation of the Trinity House on, <i>with plates</i>	Collinson, Sir Rich. K.C.B., Vice-Admiral.	XIX 82 465	1875

SUBJECT OF LECTURE OR PAPER.	NAME OF AUTHOR.	Vol., No., and Page of Journal.	Year.
		Vol. No. P.	
FOG-SIGNALLING by Explosives, <i>see Explosives.</i>			
FORCES, our Military, The Constitution of, and the Conditions of Military Service	Robertson, A. Cunningham, Col.	XIII 56 477	1869
— War, The Distribution of our, <i>with map</i>	Colomb, J. C. R., Captain Royal Marine Artillery	XIII 53 37	1869
FOREIGN Armies, The Practical Instruction of Staff Officers in, <i>with map</i>	Burnaby, F. G., Capt. Roy. Horse Guards	XVI 68 683	1872
— and English Maps, and their Use for Military Purposes	Wilson, C. W., Capt. R.E.	XVI 67 245	1872
FORMS for Registering the angles of rolling, &c., <i>see Registering.</i>			
FORTIFICATIONS on the Russian-German frontier	Anonymous ..	XX 87 509	1876
FRANCE and Prussia in 1870, The Military Systems of	Brackenbury, C. B., Capt. R.A.	XV 63 232	1871
— Manteuffel's Campaign in the East of, <i>with map</i>	Gun, H. A., Capt. R.E.	XVII 72 268	1873
— the North of, a Visit to some of the Battle Fields and Ambulances of	Mouat, F. J., Surgeon-Maj., M.D.	XV 64 459	1871
— Prussia, and England, The Government Breech-Loading Rifles of, <i>with plate</i>	Drake, Mervin, Capt. R.E.	XV 64 438	1871
— State Navy of	Anonymous ..	XX 86 419	1876
FRENCH and Montigny Mitrailleurs:— Machine Guns; the Gatling Battery, the Agar and Claxton Guns, <i>with plates</i>	Gatling, R. J. ..	XIV 60 504	1870
— Army, The Constitution, Composition and Recruiting of	Balfour, G., Maj.-Gen. C.B., R.A.	XI 47 569	1867
— Infantry Tactics, New	Hale, Lonsdale A., Maj. R.E.	XX 87 578	1876
— International Exhibition of 1867, The Naval Department of	Colomb, P. H., Comr. R.N.	XII 48 54	1868
— Rifle, New, <i>with plate</i>	Livesay, R. A. E., Capt. R.E.	XX 86 400	1876
FUEL. Economy of, in Ships of War, <i>with illustrations</i>	Prideaux, T. Symes, C.E.	XVI 68 315	1872

SUBJECT OF LECTURE OR PAPER.	NAME OF AUTHOR.	Vol., No., and Page of Journal.	Year.
FUEL, The Economy of, comprising Mineral Oils	Rankine, Professor W. J. Macquorn	Vol. No. P. XI 44 218	1867
G.			
GAME of Naval Tactics, <i>see Naval Tactics.</i>			
GATLING Gun; its place in Tactics, <i>with illustrations</i>	Rogers, E., Capt.	XIX 82 419	1875
GENEVA Convention of 1864, in Relation to Aid afforded by Volunteer Societies to Sick and Wounded Soldiers during the late Franco-Prussian War, &c.	Longmore, T., C.B., M.D.	XVI 67 206	1872
—— The Convention of, and National Societies for Aid to Sick and Wounded Soldiers in War	Furley, John ..	XX 88 632	1876
GEOGRAPHY, Military, of Central Asia, <i>with maps.</i>	Baker, Valentine, Col. late 10th Hussars	XVIII 79 453	1874
GERMANY, Improvements in Tactics in, <i>see Tactics.</i>			
GERMAN Railway Regiment	Rawson, H.E., Lt. R.E.	XX 88 738	1876
—— Army in Peace and War, the Medical Department of the	Fox, T. W., Surgeon-Gen., R.E.	XX 87 560	1876
GILMORE's Safety Lamps for Mines and Ships, <i>with illustrations</i>	Gilmore, A. H., Comr. R.N.	XIV 59 394	1870
GOLD Coast of Africa, the best Mode of Defence of the Protected Territories on the, and the Organization of a Force sufficient for that Purpose, <i>with map</i>	Lauderdale, Adm. the Earl of, G.C.B.	XVII 74 676	1873
GREAT Guns (Naval), and Gunnery, <i>with illustrations</i>	Russell, John Scott	XIX 82 446	1875
—— Guns, the Revolving System of Firing, <i>with plates</i>	Sharpe, Benjamin, Comr. R.N.	XIII 56 460	1863
GRIFFITHS, Bow and Stern-Screw Steam-Ship, <i>see Bow and Stern-Screw, &c.</i>			
GUN-CARRIAGE, Innes's Self-Acting, with Elevating Mantlet, <i>with illustrations</i>	Innes, Alex., Major Aberdeen Artillery Volunteers	XIX 82 524	1875
—— Muzzle-Pivoting; Lever, Fulcrum, and Incline Plane Principle, <i>with illustrations</i>	Heathorne, T. B. Capt. (h.p.) R.A.	XII 49 169	1862

SUBJECT OF LECTURE OR PAPER.	NAME OF AUTHOR.	Vol., No., and Page of Journal.	Year.
GUNCOTTON, applied to Demolitions, <i>with plates</i>	Fisher, A. a'Court, Col., C.B., R.E.	Vol. No. P. xiv 60 419	1870
GUN, Description of Mont Storm's Breech-loading 9-pounder Field or Pinnace, <i>with illustrations</i>	Phelps, Charles ..	xiv 59 374	1870
—— Field, for India, <i>with plates</i> ..	Maxwell, H. H., Col. R.A.	xiv 58 179	1870
—— first 35-ton, Powder Pressures in the, <i>with plates</i>	Dawson, Wm., Comr. R.N.	xvii 70 1	1873
—— Light, Short, throwing a Heavy, Sharp - Edged, Discoidially - Formed Projectile, <i>with plate</i>	Hutchinson, W.N., Lt.-Gen.	xi 43 40	1867
—— Heavy Breech-Loading, of Novel Construction, a Proposal for, <i>with plates</i>	Morgan, J.P., Capt. R.A.	xiv 60 479	1870
—— Platform, Elevating, <i>illustrated</i> ..	Stone, C.P., Lieut. 77th Regt.	xiii 53 84	1869
—— The Mackay, and Projectiles, <i>with plate</i>	Mackay, James ..	xii 50 359	1868
—— The Macomber, <i>with plate</i>	Macomber, D. O., C.E.	xix 81 268	1875
GUNPOWDER, Explosive Agents applicable to Naval and Military Purposes as Substitutes for	Abel, F.A., F.R.S.	xvi 68 457	1872
—— Schultze's Granulated-wood ..	Dougall, James D.	xii 48 127	1868
—— The Determination of the Explosive Force of, <i>with plates</i>	Morgan, J. P., Capt. R.A.	xv 64 312	1871
GUNS, Breech-Loading and Muzzle-Loading for, <i>with illustrations</i>	Morgan, J.P., Maj. R.A.	xviii 78 408	1874
—— Field, Notes on	James, W. H., Lt. R.E.	xx 87 684	1876
—— Heavy, Rifling for, <i>with illustrations</i>	Morgan, J. P., Capt. R.A.	xvii 74 648	1873
—— Heavy, the Working of, and Projectiles, <i>with plates</i>	Cunningham, H.D. P., Major 3rd Hants Artillery Volunteers	xiv 57 108	1870
—— Heavy, Working, on the Broadside, with some observations on the All-Round Fire, combined with the Broad-side System of Armament, <i>with plate</i>	Wilson, Edmund, Capt. R.N.	xiii 53 110	1869

SUBJECT OF LECTURE OR PAPER.	NAME OF AUTHOR.	Vol., No., and Page of Journal.	Year.
GUNS, Naval, <i>with plate</i>	Dawson, Wm., Comr. R.N.	VOL. No. P. XVI 68 343	1872
—— Heavy, On Mounting and Working at Sea, <i>with plates</i>	„ „	XVI 86 401	1872
—— Machine—the Gatling Battery, the Agar and Claxton Guns, the French and Montigny Mitrailleurs, <i>with illus- tration</i>	Gatling, R.J. ..	XIV 60 504	1870
—— The Working of Heavy Broadside..	Drew, Andrew A. W.	XI 43 67	1867
GYMNASTIC Exercises and Military Drill, The Military and Naval Force derivable from the Introduction of, as part of a National System of Education into all Elementary Schools	Chadwick, Edwin, C.B.	XIV 59 287	1870
H.			
HAMMOCK, Naval, its Buoyancy and Use in Saving Life at Sea in Cases of Collision, &c.	Ryder, A.P., Rear- Admiral	XV 62 111	1871
HANOVER, The Last Campaign of, <i>with maps</i>	Brackenbury, H., Capt. R.A.	XIV 58 255	1870
HARBOUR Defence	Moncrieff, Alexan- der, Major	XIX 81 357	1875
HARBOUR of Sevastopol; Ship Raising, especially with reference to his Ex- perience in Raising the Russian Ships sunk in the, <i>with plates</i>	Gowen, John E., Colonel United States Army	XIII 55 348	1869
HARBOURS, Military or Strategic, and Refuge	Coode, Sir John, Kt., C.E.	XIX 81 334	1875
—— Military, The Strategical Importance of the, in the British Channel, as connected with Defensive and Offensive Operations, <i>with maps and plate</i>	Collinson, T. B., Maj.-Gen. R.E.	XVIII 77 227	1874
HELIOGRAPH, or Sun Telegraph, Mance's..	Goode, Samuel ..	XIX 83 533	1875
HELM Indicator, for the Prevention of Collisions at Sea, <i>with illustrations</i>	Read, George, R.N.	XII 48 141	1868

SUBJECT OF LECTURE OR PAPER.	NAME OF AUTHOR.	Vol., No., and Page of Journal.	Year.
HELM-SIGNALS, Read and Nicholl's Patent Day and Night, for Preventing Collisions at Sea, <i>with plate</i>	Read, George, R.N.	Vol. No. P. xvi 69 749	1872
HERAT to Khiva, Journeys from, <i>with map</i>	Goldsmid, Sir Frederick J., Major-General, C.B., K.C.S.I.	xix 80 1	1875
HILL's Boat Lowering and Self-Detaching Apparatus, <i>with plate</i>	Hill, E. J. ..	xvi 69 762	1872
HINDUSTAN and Central Asia, the Steppes of; The Communications, Commercial and Military, between, <i>with map</i>	Adair, R.A. Shafto, Col.	xi 45 362	1867
HISTORY, Military, The Study of, by the Regimental Officers of the Army, <i>with maps</i>	Hale, Lonsdale A., Maj. R.E.	xx 87 508	1876
HISTORICAL Records of the 1st Regiment of Militia, or 3rd West York Light Infantry—(Notice of Book)	Raikes, G.A., Capt. 3rd W. Y. L. I.	xx 88 761	1876
HISTORY, Naval, The Scientific Study of ..	Laughton, J. K., R.N.	xviii 79 508	1874
HOLLAND, The Military Resources of ..	Vincent, C. E. H. Lieut.-Col. Central London Rifle Rangers	xx 87 575	1876
HOLMES's Storm and Signal Lights, <i>illustrated</i>	Holmes, Nathaniel	xvi 66 24	1872
HONDURAS, Extracts from a Report on Orange Walk, New River, as a Military Position for the Protection of British Interests in, with Notes and Experiences on Outpost Duty in the Bush	Bale, Lieut. 1st W. I. Regt.	xvii 75 806	1873
HOSPITAL Ship, H. M. S. "Victor Emanuel" as an, during the late Ashantee Campaign, <i>with plate</i>	Ryder, A.P., Vice-Admiral	xviii 78 383	1874
—— Ships, Ventilation of, <i>with plates</i> ..	Macdonald, J. D., M.D., Staff-Surgeon R.N.	xviii 76 136	1874
—— Barracks, Camps and Shipping, &c., Suggested Improvements in Sanitary Arrangements of	Synge, Millington, Maj.-Gen. R.E.	xviii 78 229	1874
HORSES for Military Purposes, The Breeding of	Hosier, H. M., Capt.	xvi 69 735	1872

SUBJECT OF LECTURE OR PAPER.	NAME OF AUTHOR.	Vol., No., and Page of Journal.	Year.
HOTSPUR-GLATTON Experiments, Lessons from the, <i>with plates</i>	Barnaby, Nathaniel, Chief Naval	Vol. No. P. XVII 72 294	1872
— — Discussion	" "	" " 315	1872
HYGIENE, Military	De Chaumont, F., M.D., Army Medical School, Net- ley	XIV 59 336	1870
I.			
INDIA, Certain Roads between Turkestan and, independent of the Oxus or of any Oxus Boundary, <i>with map</i>	Goldsmid, Sir Frederic J., Colonel, C.B., K.C.S.I.	XVIII 79 469	1874
— On Military Transport and Supply in	Collen, E. H. H., Lieut. R.A.	XVI 68 477	1872
— The Euphrates Valley Route to, in connection with the Central Asian Question, <i>with map</i>	Andrew, W. P. ..	XVII 73 472	1873
— The Field Gun for, <i>with plates</i> ..	Maxwell, H. H., Col. R.A.	V 179	1870
— The North-West Frontier of, <i>with map</i>	Campbell, George, Bengal Civil Ser- vice	XIII 54 217	1869
— The Military Advantages of a Daily Mail Route to, through Turkey and the Persian Gulf, <i>with map</i>	Clarke, Hyde ..	XII 49 181	1868
INDIAN Forces, The Sikh and European Soldiers of our	Eyre, Vincent, Maj.-Gen., C.B., R.A.	XI 43 86	1867
INFANTRY Forces and Infantry Reserves, Our, and Army Organization	Leahy, Arthur, Maj. R.E.	XII 50 310	1868
— Our, Is a Radical Change in the Tactical formation of, Really Necessary?	Thesiger, Hon. Frederic, Col., C.B.	XVII 73 411 .	1873
— Tactics	Williams, W. J., Col. R.A.	XVI 69 768	1872
— Tactics, The New French	Hale, Lonsdale A., Maj. R.E.	XX 87 578	1876
INGLEFIELD'S New Hydraulic Steering Apparatus, as being fitted to H.M.S. "Achilles," <i>with plate</i>	Ingle Ca	XIII 53 22	1860

SUBJECT OF LECTURE OR PAPER.	NAME OF AUTHOR.	Vol., No., and Page of Journal.	Year.
INNES'S Self-Acting Gun-Carriage, with Elevating Mantelet, <i>with illustrations</i>	Innes, Alex., Major Aberdeen Artillery Volunteers	Vol. No. P. XIX 82 524	1875
INSTRUCTION, Scientific, in the Navy ..	Laughton, J. K., R.N.	XIX 81 217	1875
INSTRUMENTS, Improved, for Military Sketching, <i>illustrated</i>	Hutchinson, A.H., Maj. R.A.	XVII 70 65	1873
INSUFFICIENT Stability of H.M.'s late Turret Ship "Captain" and of other Ironclads, on the Causes of, <i>with plates</i>	Fishbourne, E. Gardiner, Rear-Admiral, C.B.	XV 62 1	1871
INTELLIGENCE Duties of the Staff, Abroad and at Home	Brackenbury, C.B., Maj. R.A.	XIX 81 242	1875
INVADING Force Landing on the East Coast, The Protection of London against an, <i>with map</i>	Tulloch, Alexander B., Capt. 69th Regt.	XIV 59 358	1870
INVASION, Our Naval and Military Establishments regarded with reference to the Dangers of	Harcourt, Vernon, Esq., Q.C., M.P.	XVI 68 575	1872
—— The Strategy of, as exemplified in the American and Austro-Prussian Wars, and in the War of Metz, with Remarks on Centres of Defence and the Training of National Forces	Adair, B. A. Shafto, Col.	XVI 67 153	1872
IRONCLADS, Circular, <i>with plates</i>	Reed, E. J., C.B., M.P.	XX 85 85	1876
—— Present and Future, <i>with plate</i> ..	Henwood, Charles F.	XIV 58 148	1870
IRONCLAD Ships of War, New Form of, <i>with illustration</i>	Wheatley, John, Capt. R.N.	XV 64 476	1871
IRON Ships and Iron Beams, &c., of Wooden Vessels, the Demagnetization of, to prevent the Deviation of the Compasses, experimentally shown by means of a Model, <i>with plates</i>	Hopkins, Evan	XI 44 260	1867
—— Ships, The Present State of our Knowledge regarding the Magnetism of, <i>with plates</i>	Evans, F. J., Staff Capt. R.N.	XVI 66 78	1872
—— The Application of, to Fortifications, <i>with plates</i>	Jervois, Col., C.B., R.E.	XII 52 548	1868
ITALIAN Army, The, <i>with illustration</i> ..	Waveney, Col. Lord	XX 86 359	1876

SUBJECT OF LECTURE OR PAPER.	NAME OF AUTHOR.	Vol., No., and Page of Journal.	Year.
J.			
JAHRESBERICHTE über die Veränderungen und Fortschritte im Militairwesen—(Notice of Book)	Anonymous	Vol. No. P. XX 87 590	1876
K.			
KAFIR Wars, British Troops and Savage Warfare, with special reference to, <i>with map</i>	Gawler, Col., late 73rd Regt.	XVII 75 922	1873
KHIVA, Journeys from Herat to, <i>with map</i>	Goldsmid, Sir Frederick J., Major-General, C.B., K.C.S.I.	XIX 80 1	1875
—— The late Russian Campaign against, <i>with map</i>	Trench, F. Chenevix, Capt. 20th Huss.	XVIII 77 212	1874
KNAPSACK, White's Porte-, <i>with illustration</i>	White, Wm.	XVI 69 747	1872
KÖNIGGRATZ, The Battle of, <i>with maps</i> ..	Walker, Beauchamp, Col., C.B., Military Attaché, Berlin	XII 51 440	1868
L.			
LABOUR, Military	Webber, C. E., Capt. R.E.	XIV 57 73	1870
LAMPS, Safety, Gilmore's, for Mines and Ships, <i>with illustration</i>	Gilmore, A. H., Comr. R.N.	XIV 59 394	1870
LAND-Transport Service of the Army, Suggestions for	Beazley, G. G., Capt. 83rd Regt.	XIII 56 564	1869
LAUNCH of H.M.S. "Northumberland," <i>with plates</i>	Hay, Sir Jno. C.D., Bart., C.B., M.P.	XIII 56 435	1869
LAW, Military	Blake, G. Frederic, Capt. R.M.	XI 47 506	1867
LEITFADEN für den Unterricht in der Dienstkenntniss auf den Königlichen Kriegsschulen—(Notice of Book)	Schnackenburg, Capt.	XX 83 761	1876
LE MANS, The Winter Campaign of, <i>with maps</i>	Brackenbury, C.B., Capt. R.A.	XV 64 580	1871
LIFE-BUOYS, Improved, and a System of Deck-Rafts for Saving Life at Sea, <i>illustrated</i>	Hamilton, Mark, M.D., Surgeon R.N.	XVII 74 725	1873

SUBJECT OF LECTURE OR PAPER.	NAME OF AUTHOR.	Vol., No., and Page of Journal.	Year.
LIFE-SAVING Apparatus, Rogers's, <i>with plate</i>	Rogers, J. B. ..	Vol. No. P. XIV 57 26	1870
——— Bed or Mattress	Smith, Henry ..	XIII 54 216	1869
LIGHT Infantry, Movements, &c., of ..	Bell, T. Lynden, Major 1st Batt. 6th Regt.	XIV 61 584	1870
——— Vessels, &c., apparatus for ..	Read, George, R.N.	XII 48 144	1868
LIGHTING of H.M. Ships, <i>with plate</i> ..	Colomb, P. H., Capt. R.N.	XVI 68 437	1872
LIGHTS, Improved Binnacle, The Earl of Caithness's Gravitating Compass, and Nunn's, <i>with plate</i>	Colomb, P. H., Comr. R.N.	XII 49 272	1868
——— Signal, of Captains Colomb and Bolton, <i>with plate</i>	„ „	XII 50 373	1868
——— Storm and Signal, Holmes's, <i>illustrated</i>	Holmes, Nathaniel,	XVI 66 24	1872
LISSA, Lessons from, <i>with plate</i>	Colomb, P. H., Comr. R.N.	XI 43 104	1867
LONDON, The Protection of, against an Invading Force Landing on the East Coast, <i>with map</i>	Tulloch, Alexander B., Captain 69th Regt.	XIV 59 358	1870
LOWERING and Raising, Engaging and Disengaging Ships' Boats, on Improve- ments in Apparatus for, <i>with plate</i>	Folkard, A.	XVIII 77 278	1874
——— and Sustaining Ship's Quarter- Boats, <i>Plan of, with plates</i>	Simpson, C. H., Capt. R.N.	XI 47 519	1867
——— Boats at Sea, <i>with plate</i>	Lacon, W. Stirling	XVII 71 97	1873
LUMLEY's Patent Rudder, <i>with plates</i> ..	Lumley, Henry ..	XIV 57 70	1870
LUSHAIE Expeditionary Force, 1871-72, An Account of the Proceedings of the Chittagong Column of, <i>with map</i>	East, C.J., Brevet- Maj. 41st Regt.	XVII 71 113	1873
M.			
MACHINE Guns:—the Gatling Battery, the Agar and Claxton Guns, the French and Montigny Mitrailleurs, <i>illustrated</i>	Gatling, R. J. ..	XIV 60 504	1870
MACKAY Gun and Projectiles, <i>with plate</i> ..	Mackay, James ..	XII 50 359	1868
MACOMBER Gun, <i>with plate</i>	Macomber, D. O.	XIX 81 268	1875

SUBJECT OF LECTURE OR PAPER.	NAME OF AUTHOR.	Vol., No., and Page of Journal.	Year.
MAGNETISM of Iron Ships, the Present State of our Knowledge regarding the, <i>with plate</i>	Evans, F. J., Staff Capt. R.N.	Vol. XVI No. 66 P. 78	1872
MAGNETO - ELECTRIC Light, <i>with illustrations</i>	Abney, W. de W., Capt. R.E.	XX 86 332	1876
MANŒUVRES, Autumn, Abroad and at Home, 1869-70	Codrington, Sir William J., Gen.	XVI 68 497	1872
— Autumn, of England	Brackenbury, C.B., Capt. R.A.	XVI 67 222	1872
— of 1872	" "	XVII 71 73	1873
— Peace, Artillery Fire in, <i>illustrated</i>	Carmichael, L. M., Capt. 5th Royal Irish Lancers	XVIII 78 449	1874
— Peace, the Theory and Practice of, with their Relation to Real Warfare, <i>with maps</i>	Chesney, C. C., Lt.-Col. R.E.	XVI 68 550	1872
— The Autumn, of the Prussian Guard Corps in September, 1872, <i>with maps</i>	Hildyard, H., Lt. 72nd Highlanders	XVI 69 781	1872
MANCHESTER's Heliograph, or Sun Telegraph ..	Goode, Samuel ..	XIX 83 533	1875
MANNING the Navy	Reddie, James	XI 45 279	1867
MANTLET, Moveable Steel, for the Protection of Artillery and Troops, <i>with plate</i>	Eddy, Charles B.	XIII 55 326	1869
— Elevating, with Innes's Self-Acting Gun-Carriage, <i>illustrated</i>	Innes, Alex., Major Aberdeen Artillery Volunteers	XIX 82 524	1875
MANTEUFFEL's Campaign in the East of France, <i>with map</i>	Gun, H. A., Capt. R.E.	XVII 72 268	1873
MAPS, English and Foreign, and their Use for Military Purposes	Wilson, C. W., Capt. R.E.	XVI 67 245	1872
— Notes on (Lecture to Officers of Volunteers)	" "	Special No. } p.38	1873
MARCHES	Colley, G. P., Maj. 2nd Queen's, &c.	XVII 70 47	1873
MARINE and Army Night Telegraph, The Spakowsky	Doty, H. H., Capt.	XI 47 658	1867
MARINES, The Royal, are they a Necessary Auxiliary to the Royal Navy ?	Schomberg, Major-General, C.B., R.M.A.	XV 64 486	1871

SUBJECT OF LECTURE OR PAPER.	NAME OF AUTHOR.	No., Vol., and Page of Journal.	Year.
MARITIME Defence of England, <i>see Defence.</i>		Vol. No. P.	
—— Rights	Ross of Bladens- berg, John, Cold- stream Guards	xx 87 423	1876
MARTINI-HENRY Rifle, Proposed Alter- ations in, <i>illustrated</i>	Thayer, L.O., M.D.	xix 83 654	1875
—— Rifle, <i>with plates</i>	Majendie, V. D., Capt. R.A.	xiii 55 360	1869
MEDICAL Department of the German Army in Peace and War	Fox, T. W., Sur- geon-Gen. R.E.	xx 87 560	1876
MEMORY , a New Method of Improving the, and Facilitating the Acquirement of Knowledge	Pick, Dr. E. ..	xi 43 78	1867
MERCANTILE Marine, The, considered as an Auxiliary to the Royal Navy	Brassey, Thos., M.P.	xx 87 493	1876
MERCHANT Service, Is Our, any Longer a Feeder to the Royal Navy?	Wilson, J.C., Capt. R.N.	xx 85 61	1876
META-CENTRE , Ship's, Practical Method of Finding, at great Angles of Inclina- tion, <i>illustrated</i>	Blom, T.A., Chief Constructor, Nor- wegian Navy	xvii 73 423	1873
METEOROLOGY , The Sea Temperature and Currents of the 10° square of the Atlantic which lies between the Equa- tor and 10° N., and from 20° to 30° W., <i>with plates</i>	Toynbee, H., Capt.	xvii 72 331	1873
MILITIA and Volunteers—the recent War, with reference to (Lecture to Officers of Volunteers)	Home, R., Capt. R.E.	Special } p.61 No. }	1873
MILITARY Law, <i>see Law.</i>			
MILITARY and Naval Establishments, Our, regarded with reference to the Dangers of Invasion	Harcourt, Vernon, Esq., Q.C., M.P.	xvi 68 575	1872
—— and Naval Force, The, derivable from the Introduction of Military Drill and Gymnastic Exercises, as part of a National System of Education into all Elementary Schools	Chadwick, Edwin, C.B.	xiv 59 287	1870
—— Forces, the Constitution of Our, and the Conditions of Military Service	Robertson, A. Cunningham, Col.	xiii 56 477	1869

SUBJECT OF LECTURE OR PAPER.	NAME OF AUTHOR.	Vol., No., and Page of Journal.	Year.
MILITARY Forces, Organization of, <i>see</i> <i>Organization.</i>		Vol. No. P.	
—— Telegraphy and Signalling, <i>see</i> <i>Telegraphy.</i>			
—— Hygiene	De Chaumont, F., M.D.	XIV 59 336	1870
—— Labour	Webber, C.E., Capt. R.E.	XIV 57 73	1870
—— Maxims Suggested or Exemplified by the last Autumn Manœuvres of Continental Armies, <i>with plans</i>	Shute, C. Cameron, Col., C.B.	XIV 58 206	1870
—— Model Apparatus	Clarke, E. Podmore, Capt.	XIX 84 758	1875
—— Organization, General Principles of	Colomb, J. C. R., Capt. Royal Mar. Artillery	XV 64 288	1871
—— Resources of Holland	Vincent, C. E. H., Lieut.-Col. Central London Rifle Rangers	XX 87 575	1876
—— General School, a Proposition for one, for the Army	Collinson, T. Bernard, Col. R.E.	XIII 54 241	1869
—— Science, The Study of, in time of Peace	Chesney, C.C., Lt.-Col. R.E.	XV 63 254	1871
—— Training, a Means of Administrative Power and of Political Usefulness	Goldsmid, Sir Frederick J., Major-General, C.B., K.C.S.I.	XX 87 524	1876
—— Transport	Wingfield, F., Dep. Assistant Commissary-General	XIII 54 263	1869
MINES and Ships, Gilmore's Safety Lamps for, <i>illustrated</i>	Gilmore, A. H., Comr. R.N.	XIV 59 394	1870
MITRAILLEURS, a Memorandum on ..	Shute, C. Cameron, Col., C.B.	XVI 66 53	1872
—— and their Place in the Wars of the Future, <i>with plates</i>	Fosbery, G. V., Maj. G. C., H. M. Bengal Staff Corps	XIII 56 539	1869
——, the Employment of, during the Recent War and their Employment in Future Wars, <i>with plate</i>	Fletcher, H. C., Lt.-Colonel Scots Fusilier Guards	XVI 66 28	1872

SUBJECT OF LECTURE OR PAPER.	NAME OF AUTHOR.	Vol., No., and Page of Journal.	Year.
MONCRIEFF System of Mounting Ordnance, Further Observations on, <i>with plate</i>	Moncrieff, Alexander, Maj.	Vol. No. P. XVII 74 592	1873
—— System of Mounting Ordnance, Observations on the, <i>with plates</i>	English, T., Lieut. R.E.	XVII 74 568	1873
MONCRIEFF'S Protected Barbette System, Further Particulars Regarding, <i>with plate</i>	Moncrieff, A., Captain, Edinburgh Artillery Militia	XI 44 241	1867
MONCRIEFF System, The Progress that has been made in the Application of, to Garrison, Siege, and Naval Ordnance, and to Coast Works, <i>with plates</i>	" "	XIV 59 396	1875
MONT STORM'S Breech-Loading 9-pounder Field or Pinnacle Gun, Description of, <i>with illustrations</i>	Phelps, Charles ..	XIV 59 37	1868
MOUNTED Riflemen (Lecture to Officers of Volunteers)	Wood, Evelyn, Lt.-Col., W.C., 90th L. I.	Special } No. } p.18	1873
MUSKETRY Practice, Annual, Proposed Alterations in, so as to bring it into accordance with the Infantry Tactics of the Day, <i>with illustrations</i>	Brooke, Chas. K., Capt. 15th Regt.	XIX 80 22	1875
MUZZLE-PIVOTING Gun-Carriages; Lever, Fulcrum, and Incline-Plane Principle, <i>with plate</i>	Hearthorne, T. B., Capt. (h.p.) R.A.	XII 49 169	1868
MUZZLE-LOADING and Breech-Loading for Guns, <i>with illustrations</i>	Morgan, J.P., Maj. R.A.	XVIII 78 408	1874
N.			
NATIONAL Forces, The Strategy of Invasion, as exemplified in the American and Austro-Prussian Wars and in the War of Metz, with Remarks on Centres of Defence and the Training of	Adair, R. A. Shafto, Col.	XVI 67 153	1872
NAUTICAL Surveying, Practical, <i>with plates</i>	Hull, T. A., Staff Comr. R.N.	XVI 69 701	1872
NAVAL and Military Establishments (Our), regarded with reference to the Dangers of Invasion	Harcourt, Vernon, Esq., Q.C., M.P.	XVI 68 575	1872
—— and Military Force, The, derivable from the Introduction of Military Drill and Gymnastic Exercises, as part of a National System of Education into all Elementary Schools	Chadwick, Edwin, C.B.	XIV 59 287	1870

SUBJECT OF LECTURE OR PAPER.	NAME OF AUTHOR.	Vol., No., and Page of Journal.	Year.
NAVAL Steam Transport Fleet, <i>see Steam Transport.</i>		Vol. No. P.	
— Department of the French International Exhibition of 1867	Colomb, P. H., Comr. R.N.	XII 48 54	1868
— Great Guns and Gunnery, <i>illustrated</i>	Russell, John Scott	XIX 2 446	1875
— Guns, <i>with plates</i>	Dawson, Wm., Comr. R.N.	XVI 68 343	1872
— by History, The Scientific Study of .. Con.	Laughton, J. K., R.N.	XVIII 79 508	1874
— Officers, Our, and the Public Services: Proposed Employment of Her Majesty's Ships and Naval Officers in connection with the Mail and Troop Services combined	Clanchy, H. T., Lieut. R.N.	XV 65 824	1871
— ———, the Higher Education of, <i>see Education.</i>			
— Officers, The Preliminary Education of	Goodenough, Jas. G., Capt. R.N.	XV 64 338	1871
— Ordnance, On the Accurate Firing of, by means of the Vessel's Motion, <i>with plates</i>	Bessemer, H. ..	XVII 75 888	1873
— Organization, General Principles of	Colomb, J. O. R., Capt. Royal Marine Artillery	XV 64 269	1871
— Power, The True Economics of England's	Selwyn, J.H., Capt. R.N.	XV 63 157	1871
— Reserves	Brassey, Thos., M.P.	XVII 73 501	1873
— Reserve, Royal, Three Years with the	Brent, H. W., Comr. R.N.	XVIII 78 358	1874
— Matters, Notes on	Anonymous ..	XX 86 413	1876
— Tactics, Ancient, <i>with plates</i> ..	Warre, the Rev. Edmond, M.A.	XX 88 593	1876
— Tactics, <i>see also Fleet Evolutions.</i>			
— Tactics, A New System of, <i>with plate</i>	Bower, Graham, Lieut. R.N.	XIX 82 502	1875
— Tactics, Game of, <i>with plates</i> ..	Castle, W. M. F., Lieut. R.N.	XVII 75 786	1873

SUBJECT OF LECTURE OR PAPER.	NAME OF AUTHOR.	Vol., No., and Page of Journal.	Year.
NAVAL Tactics, <i>with plate</i>	Inglefield, E. A., Capt. R.N.	Vol. No. P. XII 51 483	1868
NAVY, H.M., The Preservation of Biscuit and other Farinaceous Articles of Diet in, from Weevil, Maggots, and other Insects, <i>with illustrations</i>	Seccombe, E. ..	XIX 83 681	1875
—— Manning the	Reddie, James ..	XI 45 279	1867
—— Royal, Reserves of Officers and Seamen, <i>see Reserves.</i>			
—— Scientific Instruction in the ..	Laughton, J. K., R.N.	XIX 81 217	1875
—— The American, its Organization, Ships, Armament, and Recent Experiences, <i>with plates</i>	Hamilton, J. Randolph	XII 49 243	1868
—— The Royal, Are the Royal Marines a Necessary Auxiliary to?	Schomberg, Major-Gen. C.B., R.M.A.	XV 64 486	1871
—— The Royal, Is our Merchant Service any Longer a Feeder to?	Wilson, J.C., Capt. R.N.	XX 85 61	1876
—— The Royal, The Mercantile Marine considered as an Auxiliary to	Brassey, Thos., M.P.	XX 87 493	1876
NIGHT Telegraph, The Spakowsky, Marine and Army	Doty, H. H., Capt.	XI 47 658	1867
NICHOLL and Read's Patent Day and Night Helm-Signals for Preventing Collisions at Sea, <i>with plate</i>	Read, George, R.N.	XVI 69 749	1872
NOLAN's Range Finder and Ranges, <i>illustrated</i>	Nolan, Jno. Philip, Capt. R.A.	XIV 57 1	1870
"NORTHUMBERLAND," The Launch of H.M.S., <i>with plates</i>	Hay, Sir John C.D., Bart., C.B., M.P.	XIII 56 435	1869
NOTES on Naval Matters, <i>see Naval Matters.</i>			
O.			
OCEAN Currents	Laughton, J. K., R.N.	XV 65 663	1871
—— Currents and their Influences, <i>with map</i>	Findlay, A. G. ..	XIV 58 133	1870
OFFICERS, Regimental, the Appointment and Promotion of	Robertson, A. Cunningham, Col.	XII 49 192	1868

SUBJECT OF LECTURE OR PAPER.	NAME OF AUTHOR.	Vol., No., and Page of Journal.	Year.
PRECISION, Arms of, How far the Employment of Cavalry is Affected by Recent Improvements in	Smith, Michael W., Maj.-Gen., C.B.	Vol. No. P. XII 49 147	1868
———— The Amount of Advantage which they give to the Defence over the Attack	Schaw, H., Capt. R.E.	XIV 59 377	1870
PRIMITIVE Warfare, <i>see Warfare.</i>			
PROMOTION, The Austrian Confidential Report, and New Method of	Vincent, C. E. H., Lieut. 23rd Royal Welsh Fusiliers	XVI 66 151	1872
PROJECTILES, Chilled White Iron, and the Conversion and Rifling of Cast-Iron Ordnance, <i>with plates</i>	Palliser, William, Major late 18th Hussars	XI 44 149	1867
———— <i>et la Loi des Erreurs, Sur la Dispersion Naturelle des—</i> (Notice of Book)	Van Meyden, Aloys., Capt. d'Artillerie, Lau- sanne	XX 88 762	1876
———— Working Heavy Guns and, <i>with plates</i>	Cunningham, H. D. P., Major 3rd Hants Artillery Volunteers	XIV 57 108	1870
PROJECTILE, The Best Form of Cartridges for Breech-Loading Small Arms, <i>with plate</i>	O'Hea, J. B., Capt. late 25th Regt.	XII 48 105	1868
PROPELLER, a Cylindrical, Working on a Vertical Shaft in the Midship Section of a Ship, <i>illustrated</i>	Skinner, Major- General, C.B.	XIV 58 174	1870
———— Screw, Further Experiments with his Bow and Stern, <i>with plate</i>	Griffiths, R., C.E.	XVIII 77 157	1874
———— of H. M. S. "Bruiser," On the Casing of the, <i>with plate</i>	" "	XX 86 171	1876
PROPELLING Steam Ships, best Method of	" "	XX 88 684	1876
PROPELLER, The Hydraulic, as a Motive Power for Ships, <i>illustrated</i>	Elliot, G., Vice- Admiral	XI 47 589	1867
———— The Turbine, <i>with plate</i>	Murray, And., C.B.	XV 65 643	1871
PROPELLERS, Proposed New Combination of, for Ships of War	Quick, Geo., Engi- neer R.N.	XX 86 157	1876
PROPULSION, a New Mode of Marine, <i>with plate</i>	Simpson, C. H., Capt. R.N.	XI 47 646	1867
———— Screw, a New Adaptation of, <i>with plate</i>	Paynter, J. Aylmer, Rear-Admiral	XVIII 79 527	1874

SUBJECT OF LECTURE OR PAPER.	NAME OF AUTHOR.	Vol., No., and Page of Journal.	Year.
PRUSSIAN Drill, 1876	Newdigate, E., Col.	Vol. No. P. xx 88 719	1876
——— Army, System of Officering, A Brief Sketch of	Vincent, C. E. H., Lieut. 23rd Royal Welsh Fusiliers	xvi 69 796	1872
——— Drill-Book, Changes in, <i>see Drill.</i>			
PRUSSIA, The Government Breech-Loading Rifles of, and of France and England, <i>with plate</i>	Drake, Mervin, Capt. R.E.	xv 64 438	1877
——— The Military Systems of, and of France in 1870	Brackenbury, C.B., Capt. R.A.	xv 63 232	1871
R.			
RAILWAYS, On the Organization of the Communications of an Army, including, <i>illustrated</i>	Home, Lieut.-Col. R.E., C.B.	xix 82 381	1875
——— Field, and their General Appli- cation in War, <i>with plates</i>	Luard, C.E., Capt. R.E.	xvii 74 693	1873
RAILWAY Regiment, The German	Rawson, H. E., Lt. R.E.	xx 88 738	1876
RANGE-INDICATOR, Campbell's, <i>with plate</i>	Campbell, J. R., Capt. Hants Militia Artillery	xvi 67 309	1872
RANGES and Nolan's Range Finder ..	Nolan, John Philip, Capt. R.A.	xiv 57 1	1870
READ and Nicholl's Patent Day and Night Helm-Signals, for Preventing Collisions at Sea, <i>with plate</i>	Read, George, R.N.	xvi 69 749	1872
RECOIL Utilized, <i>with plate</i>	Hutchinson, W.N. Lt.-Gen.	xiii 53 75	1869
RECORDS, Historical, of the First Regiment of Militia, or 3rd W. Y. L. Infantry— (Notice of Book)	Baikes, G.A., Capt. 3rd W. Y. L. I. Militia	xx 88 761	1876
RECRUITING, Constitution and Composition of the French Army	Balfour, G., Maj.- Gen., C.B., R.A.	xi 47 569	1867
——— for the Army, The Best Mode of, and the Influences bearing upon that Service	Noake, R.C., Capt. Adjutant Scot- tish Borderers Militia	xi 43 27	1867
——— Question, The, from a Military and a Medical point of View	Adams, A. Leith, M.D., Surg.-Maj.	xviii 76 55	187

SUBJECT OF LECTURE OR PAPER.	NAME OF AUTHOR.	Vol., No., and Page of Journal.	Year.
RECRUITING Question, Universal Conscription, the Only Answer to.—(The Institution's Military Prize Essay, 1875)	Hime, H. W. L., Capt. R.A.	Vol. No. P. XIX 80 92	1875
—— Discussion on		" " 146	"
—— System, The Establishment of County Military Training Schools; a Suggestion for Improving the	Thomas, W. Cave, late Captain 19th Middlesex Rifle Volunteers	XIII 54 148	1869
RED River Expedition, <i>with maps</i>	Huyshe, G. L., Capt. Rifle Bri- gade	XV 62 70	1871
REFORMS in Army Administration	De Fonblanque, E. B., Dep. C.-G.	XIII 53 88	1869
REGIMENTAL Officers, The Appointment and Promotion of	Robertson, A. Cunningham, Col. 8th Regt.	XII 49 192	1868
—— of the British Army, the Cultivation of Scientific Knowledge by, <i>see Army</i> .			
REGISTERING the Angles of Rolling and Heeling, for the Information of the Construction Department of the Admiralty, Forms for, <i>illustrated</i>	Ryder, A.P., Rear- Admiral	XV 62 58	1871
RESERVE Forces, Our, <i>with map</i>	Malet, Lieut.-Col. Gren. Guards	XIII 54 160	1869
—— On the Best Practicable Method for Ensuring Efficiency in the Army, and for Obtaining an Effective and Reliable, having regard to the Existing Feeling in the Country on the Subject	Warde, Sir Edward C., K.C.B., Maj.- Gen. R.A.	XIX 80 128	1875
—— Our First	Fox, L. Loftus B., Capt. Royal Longford Rifles	XIII 53 1	1869
RESERVES, Infantry, Army Organization, our Infantry Forces and	Leahy, Arthur, Maj. R.E.	XII 50 310	1868
—— Naval, <i>see Naval Reserves</i> .			
—— of Officers and Seamen for the Royal Navy, The Formation of, and the Evils and Inadequacy of Impressment to provide the same	Gardner, G. H., Capt. R.N.	XV 65 601	1871
RETREAT of the Ten Thousand; a Military Study for all time, <i>with map</i>	Vaughan, J. L., C.B., Maj.-Gen.	XVIII 76 90	1874

SUBJECT OF LECTURE OR PAPER.	NAME OF AUTHOR.	Vol., No., and Page of Journal.	Year.
RIFLED Ordnance, Heavy, The Construction of, <i>with plate</i>	Palliser, Major William, late 18th Hussars	Vol. No. P. XII 50 378	1868
RIFLES and Rifling, <i>with plates</i>	O'Hea, J.B., Capt. late 25th Regt.	XVII 72 356	1873
—— Breech-Loading, The Government of France, Prussia, and England, <i>with plate</i>	Drake, Mervin, Capt. R.E.	XV 64 438	1871
RIFLING, and Conversion of Cast-Iron Ordnance, and on Chilled White Iron Projectiles, <i>with plates</i>	Palliser, Maj. William	XI 44 149	1867
—— for Heavy Guns, <i>with illustrations</i> ..	Morgan, J. P., Capt. R.A.	XVII 74 648	1873
RIFLEMEN, Mounted, <i>see Mounted Riflemen</i> .			
ROGERS's Life-Saving Apparatus, <i>with plate</i>	Rogers, J. B. ..	XIV 57 28	1870
ROLLING of a Ship in a Sea-way and the Contemporaneous Wave Slopes, Apparatus for Automatically Recording, <i>with plates</i>	Froude, William, M.A., F.R.S.	XVII 75 858	1873
ROYAL Navy; Is our Merchant Service any Longer a Feeder to the?	Wilson, J.C., Capt. R.N.	XX 85 61	1876
—— Naval Reserve, Three Years with ..	Brent, H.W., Comr. R.N.	XVIII 78 358	1874
RUDDER, Jury, Explanation of a, invented by him, <i>with plate</i>	Commerell, Sir J. E., B.C., K.C.B., Capt. R.N.	XIX 84 956	1875
—— The Fish-Tail, for all Classes of Vessels, <i>with plate</i>	Croft, J.McGrigor, M.D.	XIV 57 40	1870
RULE of the Road at Sea, or the Steering and Sailing Rules, <i>with plate</i>	Lacon, W. Stirling	XVI 67 262	1872
RUSSIAN Army	Vincent, C. E. H., Lieut. 23rd Royal Welsh Fusiliers	XVI 67 285	1872
—— Army, Recent Reforms in	Clarke, F. C. H., Capt. R.A.	XX 86 373	1876
—— Campaign, the late, against Khiva, <i>with map</i>	Trench, F. Chenevix, Capt. 20th Huss.	XVIII 77 212	1874

SUBJECT OF LECTURE OR PAPER.	NAME OF AUTHOR.	Vol., No., and Page of Journal.	Year.
RUSSIAN Ramming Diagrams, Presented to the Royal United Service Institution, A Statement to Accompany, <i>with plate</i>	Ryder, A.P., Vice-Admiral	Vol. No. P. XVIII 79 535	1874
— Ships sunk in the Harbour of Sevastopol, Ship Raising, especially with Reference to his Experience in Raising, <i>with plates</i>	Gowen, John E., Colonel United States Army	XIII 55 348	1869
RUSSIA, The Strategy of, in Central Asia, from a Persian Point of View, <i>with map</i>	Smith, R. Murdoch, Capt. R.E.	XVII 71 212	1873
RUSSO-TURKISH Campaigns of 1828-29 in Europe and Asia, A Sketch of, <i>with maps</i>	Wilbraham, Sir Richard, Lieut.-Gen., K.C.B.	XX 88 692	1876
S.			
SANITARY Arrangements of Hospitals, Barracks, Camps, and Shipping, &c., Suggested Improvements in	Synge, Millington, Maj.-Gen. R.E.	XVIII 78 299	1874
— Precautions for Troops, <i>see Troops.</i>			
SAVAGE Warfare, Experience in, <i>with map</i>	Baker, Sir Samuel White, Kt.	XVII 75 904	1873
— <i>see Warfare, and Kafir.</i>			
SCIENTIFIC Questions, State, <i>see State.</i>			
SCHOOL for the Army, <i>see General Military School.</i>			
SCHOOLS, the Establishment of County Military Training; a Suggestion for Improving the Recruiting System	Thomas, W. Cave, late Captain 19th Middlesex Rifle Volunteers	XIII 54 142	1869
— LEITFADEN für den Unterricht in der Dienstkenntniss auf den Königlichen Kriegsschulen— (Notice of Book)	Schnackenburg and Bartels	XX 761	1876
SCREW-SHIP Steerage, means of, and a Description of the Hydrostatic Steering Gear fitted on board H.M.S. "Achilles," with the Results of Experiments at Sea; also a Plan of Apparatus fitted on board the Turkish Ironclad "Fethi-Bulend," <i>with plates</i>	Inglefield, E. A., Rear-Admiral	XIV 57 52	1870
— Line of Battle Ships, the Conversion of our, into Armoured Turret Ships <i>with plates</i>	Henwood, Chas. F.	XIII 191	1869

SUBJECT OF LECTURE OR PAPER.	NAME OF AUTHOR.	Vol., No., and Page of Journal.	Year.
SCREW Propulsion, a New Adaptation of, <i>with plates</i>	Paynter, J. Aylmer, Rear-Admiral	Vol. No. P. XVIII 79 527	1874
SEAMEN of the Country, How Best to Improve and keep them up	BRASSEY, Thos., M.P.	xx 85 110	1876
— of the Fleet; their Training, and how the Employment of Marines Afloat in Peace Time affects them	Wilson, J. C., Capt. R.N.	xix 83 604	1875
SECTION Skirmishing, and Ride and Tie Patrolling	Jones, Lieut.-Col., U.C.	xvi 66 127	1872
SHELTER Tent, a Method of Converting the Regulation Bell Tent into a, with a New Arrangement for entrenching Tools, <i>with illustrations</i>	James, Wm., late 42nd Highlanders	xvi 67 183	1872
— Tent, Suggestions for a, <i>with plate</i>	Tulloch, Alexander B., Captain 69th Regt.	xvii 70 63	1873
— Trenches or Temporary Cover for Troops in Position, <i>with plates</i>	Graham, Gerald, Col., U.C., C.B., R.E.	xiv 60 448	1870
SHIPS of War, (Modern) as Illustrated by the Models in the Institution, <i>with plates</i>	Barnaby, Nathaniel	xvi 66 58	1872
— of War, Circular, with Immersed Motive Power, <i>with plates</i>	Elder, John ..	xii 52 529	1868
— of War, a new form of Ironclad, <i>with illustration</i>	Wheatley, John, Capt. R.N.	xv 64 476	1871
— Economy of Fuel in, <i>see Fuel</i> .			
— Armour-plated, Description of a Model of, as designed by him, <i>with illustration</i>	Wilson, Edmund, Capt. R.N.	xii 51 502	1868
SHIP-Raising, especially with Reference to his Experience in Raising the Russian Ships sunk in the Harbour of Sevastopol, <i>with plates</i>	Gowen, John E., Colonel United States Army	xiii 55 348	1869
SHIPS, Ventilation of, especially of Low Freeboard and Hospital Ships, <i>with plates</i>	Macdonald, J. D., M.D., R.N.	xviii 76 136	1874
— Lighting of H.M.'s., <i>see Lighting</i> .			
SHOEBURYNESSE, Summary of the Experiments at, during the year 1868-69	Mackie, Samuel J., Assoc. Inst. C.E.	xiii 55 801	1868

SUBJECT OF LECTURE OR PAPER.	NAME OF AUTHOR.	Vol., No., and Page of Journal.	Year.
SHOT Plug, Expanding; Expanding Sponge for Artillery Practice and Anti-Torpedo Vessel, <i>with plates</i>	Gilmore, A. H., Lieut. R.N.	Vol. No. P. XIII 53 30	1869
SCHULTZ'S Granulated-wood Gunpowder..	Dougall, James D.	XII 48 127	1868
SICK and Wounded in War, aid to the ..	Loyd-Lindsay, R. J., Lieut.-Col., S.C., M.P.	XV 64 381	1871
———— Societies for aid to, &c. &c.	Furley, John ..	XX 88 632	1876
———— and Wounded Soldiers during the late Franco-Prussian War, &c., the Geneva Convention of 1864, in Relation to Aid afforded by Volunteer Societies to	Longmore, T., C.B., M.D.	XVI 67 206	1872
SIEGE of Paris, Personal Experiences and Reminiscences of the, <i>with plate, &c.</i>	Wyatt, Surgeon-Major, Coldstream Guards	XVII 71 157	1873
SIGHTS of Ordnance, Note on Aligning the, when laying for an Object, <i>with illustration</i>	Grenfell, H. H., Lieut. R.N.	XVII 74 746	1873
SIGNALLING, Military, and Telegraphy, <i>with plates</i>	Stotherd, R. H. Capt. R.E.	XIV 59 312	1870
SIGNALS, Fog, in Fleets, <i>with illustrations</i>	Brent, H. W., Comr. R.N.	XV 63 136	1871
———— Some Account of the Observations recently made by the Corporation of the Trinity House on, <i>with plates</i>	Collinson, Sir Richard, K.C.B., Vice-Admiral	XIX 82 465	1875
SIGNAL Lights of Captains Colomb and Bolton, <i>with plates</i>	Colomb, P. H., Comr. R.N.	XII 50 373	1868
SIKH and European Soldiers of our Indian Forces	Eyre, Vincent, Maj.-Gen. C.B., R.A.	XI 43 86	1867
SKETCHING, Military Improved Instruments for, <i>with illustrations</i>	Hutchinson, A. H., Maj. R.A.	XVII 70 65	1873
SKIRMISHING Line, Proposed Method of Attack in	Parker, F. G. S., Capt. 54th Regt.	XVII 74 741	1873
SMALL Arms, the progress of Breech-Loading, <i>with plates</i>	Latham, John ..	XIX 83 631	1875
———— Arms, Military Breech-Loading, <i>with plates</i>	Majendie, V. D., Capt. R.A.	XI 44 190	1867

SUBJECT OF LECTURE OR PAPER.	NAME OF AUTHOR.	Vol., No., and Page of Journal.	Year
SOLDIERS' Unemployed Time, Utilization of	Sloane, Captain, Sherwood Foresters Militia	Vol. No. P. XII 48 1	1868
SÖRENSEN'S Norwegian Self-Acting Cooking Apparatus, <i>with illustration</i>	Sörensen, John ..	XII 49 292	1868
SPAKOWSKY Marine and Army Night-Telegraph	Doty, H. H., Capt.	XI 47 658	1876
SPANISH Armada, A Warning Voice from	Collinson, T. B., Maj.-Gen. R.E.	XIX 81 285	1875
—— Ships, Revolted in 1873, British Interference with	Dyer, Hugh M'Neil, Capt. R.N.	XVIII 77 283	1874
STABILITY, Insufficient, On the Causes of of H.M.'s late Turret Ship "Captain" and of other Ironclads, <i>with plates</i>	Fishbourne, E. Gardiner, Rear-Admiral, C.B.	XV 62 1	1871
STAFF, The Intelligence Duties of the, Abroad and at Home	Brackenbury, O.B., Maj. R.A.	XX 81 242	1875
—— The Connection between the Ordinary Work of, in Peace-time and War-like Efficiency (Lecture to Officers of Volunteers)	Maurice, J. F., Lieut. R.A.	Special } No. } p.80	1873
—— Officers in Foreign Armies, The Practical Instruction of, <i>with map</i>	Burnaby, F. G., Capt. Roy. Horse Guards	XVI 68 633	1872
—— Officers, the Education of	Jones, Alfred S., Maj. W.C.	XIV 59 271	1870
STATE Scientific Questions, Permanent Commission on, <i>see Commission.</i>			
STEAM Steering Screw, Bremner's, <i>with illustration</i>	Bremner, Geo., Capt.	XVII 70 69	1873
STEAM-TRANSPORT Fleet (Naval), Necessity for an increase in	Hosession, J. C., Capt. R. N.	XIV 61 530	1870
STEENSTRÖP'S Conical Screw and Breech-Loading Cannon, <i>with plate</i>	Jensen, Peter ..	XIV 57 124	1870
STEERING Apparatus, Inglefield's New Hydraulic, as being fitted to H.M.S. "Achilles," <i>with plates</i>	Inglefield, E. A., Capt. R.N.	XIII 53 22	1869
STEEN and Bow-Screw Steamships, <i>with plates</i>	Griffiths, R., C.E.	XVII 74 734	1873
—— and Bow, Screw Propeller, Further Experiments with his, <i>with plate</i>	" "	XVIII 77 157	1874

SUBJECT OF LECTURE OR PAPER.	NAME OF AUTHOR.	Vol., No., and Page of Journal.	Year.
STORM and Signal Lights, Holmes's <i>with illustration</i>	Holmes, Nathaniel	Vol. No. P. XVI 66 24	1872
STORMS in the British Islands, and Telegraphic Weather Intelligence, <i>with plate</i>	Scott, Robert H.	XIII 54 287	1869
STRATEGY of Russia in Central Asia, from a Persian Point of View, <i>see Russia</i> .			
—— of Invasion, as exemplified in the American and Austro-Prussian Wars and in the War of Metz, with Remarks on Centres of Defence and the Training of National Forces	Adair, R. A. Shafto, Col.	XVI 67 153	1872
STUART'S Breech-Loading Cannon, <i>with plates</i>	Stuart, Graham, Capt. 4th W. Y. Artil Volunteers	XIV 57 19	1870
STUDY, Scientific, of Naval History ..	Loughton, J. K., R.N.	XVIII 79 508	1874
SUBMARINE Warfare, Defensive, <i>with plates</i> .	Stotherd, R. H. Maj. R.E.	XV 65 705	1871
SUPPLY in India, <i>see Transport</i>.	.. ..	..	
SURVEYING, Practical Nautical, <i>with plates</i>	Hull, T. A., Staff Comr. R.N.	XVI 69 701	1872
—— An Occasional Note on the Use of the Aneroid Barometer in	Fawcett, R. H. Capt. 33rd Regt.	XVI 66 143	1872
SWISS Military System	Martini and Hotze	XV 64 508	1871
T.			
TACTICS, Naval, a New System of, <i>with plate, &c.</i>	Bower, Graham, Lieut. R.N.	XIX 82 502	1875
—— of the Three Arms, as Modified to Meet the Requirements of the Present Day, <i>with plates</i>	Brackenbury, H., Capt. R.A.	XVII 74 618	1873
—— Changes of, consequent on the Improvement of Weapons, &c.	Middleton, F., Lt.-Col.	Special } p. 1 No. }	1873
—— Naval, <i>with plates</i>	Inglefield, E. A., Capt. R. N.	XII 51 483	1868
—— Naval, Fleet Evolutions	Bridge, Cyprian A. G., Comr. R.N.	XVII 227	1873

SUBJECT OF LECTURE OR PAPER.	NAME OF AUTHOR.	Vol., No., and Page of Journal.	Year.
TACTICS, Military, and Formation in Germany, A Review of the Improvements in, during the last year (1873), being a précis of an Article from the "Militaire Wochenblatt"	Ouvry, H.A., Col., C.B.	Vol. No. P. XVIII 78 441	1874
— Infantry of the Day, Proposed Alterations in the Annual Musketry Practice, so as to bring it into accordance with the, <i>with illustrations</i>	Brooke, Chas. K., Capt. 15th Regt.	XIX 80 22	1875
— Naval, The Game of, <i>with plates</i>	Castle, W. M. F., Lieut. R. N.	XVII 75 786	1873
— The New French Infantry ..	Hale, Lonsdale A., Maj. R.E.	XX 87 578	1876
— The Gatling Gun; its Place in, <i>with illustrations</i>	Rogers, E., Capt.	XIX 82 419	1875
— Infantry	Williams, W. J., Col. R.A.	XVI 69 768	1872
— Ancient Naval, <i>see Ancient Naval Tactics.</i>			
TACTICAL Examples	Helvig, Hugo ..	XX 86 389	1876
— Formation of our Infantry; Is a Radical Change in, Really Necessary?	Thesiger, Hon. Frederic, Col., C.B.	XVII 73 411	1873
— Power of Modern Field Artillery ..	Brackenbury, C.B. Lieut.-Col. R.A.	XX 86 310	1876
TARGET for Eye-Training, <i>with illustration</i>	Poore, F.H. Capt. R.M.A.	XVII 73 309	1873
TELEGRAPH Cables, The Atlantic, of 1857-58, also those of 1865-66	Moriarty, H. A., Staff - Comr., R.N., C.B.	XI 44 127	1867
TELEGRAPHY and Signalling, Military, <i>with plates</i>	Stotherd, R. H., Capt. R.E.	XIV 59 312	1870
TENT, Suggestions for a Shelter, <i>see Shelter Tent.</i>			
— Bell, A Method of Converting the Regulation into a Shelter Tent, with a New Arrangement for Entrenching Tools, <i>with illustration</i>	James, Wm., late 42nd Highlanders	XVI 67 183	1872
TEN Thousand, The Retreat of the; a Military Study for all time, <i>with map</i>	Vaughan, J. L., C.B., Maj.-Gen.	XVIII 76 99	1874

SUBJECT OF LECTURE OR PAPER.	NAME OF AUTHOR.	Vol., No., and Page of Journal.	Year.
TIME, Unemployed, Utilization of the Soldiers'; A Proposed Scheme Independent of Government Supply; also a Plan for Regimental Charities	Sloane, Captain, Sherwood Foresters Militia	Vol. No. P. XII 48 1	1868
THRASYMENE, Note on the Battle of, <i>with plate</i>	Napier, the late Sir Chas. J., G.C.B., Lt.-Gen.	XVIII 78 439	1874
TORPEDO Warfare, Offensive, <i>with plates</i> ..	Dawson, Wm., Comr. R.N.	XV 62 86	1871
—— Chinese, Description of a Model of	Beal, Rev. S., R.N.	XV 75 728	1871
—— Boats, "Fortune" and "Triana," United States Navy, Description of, <i>with plate</i>	Bucknill, J. T., Lieut. R. E.	XVII 73 239	1873
TORPEDOES, Plan for Protecting Ships (at anchor) Blockading a Port from Attacks by Outrigger, Whitehead, or Harvey, <i>with plate</i>	Lindsay, Charles, Lieut. R.N.	XIX 82 528	1875
TRAINING, Military, a Means of Administrative Power, and of Political Usefulness	Goldsmid, Sir Frederic J., Major-General, C.B., K.C.S.I.	XX 87 524	1876
—— Schools, Military, The Establishment of County; a Suggestion for Improving the Recruiting System	Thomas, W. Cave, late Captain 19th Middlesex	XIII 54 143	1869
—— Boys for Soldiers	Magregor, John	XIX 82 3 9	1875
TRINITY House, Some Account of the Observations recently made by the Corporation of the, on Fog Signals, <i>with plates</i>	Collinson, Sir Richard, K.C.B., Vice-Admiral	XIX 82 465	1875
TRANSPORT Fleet, Naval, The Necessity for an Increase in our, for Military Purposes, <i>with map</i>	Hoseason, J. C., Capt. R.N.	XIV 61 530	1870
—— Military, and Supply in India ..	Collen, E. H. H., Lieut. R.A.	XVI 68 477	1872
—— Military	Wingfield, F., Dep. Asst. C.-G.	XIII 54 263	1869
TROOPS in Tropical Regions, &c., Sanitary Precautions to be observed in the Moving and Camping of	Maclean, W. C., M.D., C.B., Surgeon-General	XVIII 76 114	1874
'URBINE Propeller, <i>with plate</i>	Murray, [Andrew, C.B.	XV 65 643	1871

SUBJECT OF LECTURE OR PAPER.	NAME OF AUTHOR.	Vol., No., and Page of Journal.	Year.
TURKESTAN and India, Certain Roads between, independent of the Oxus or of any Oxus Boundary, <i>with map</i>	Goldsmid, Sir Frederic J., Col., C.B., K.C.S.I.	Vol. No. P. XVIII 79 469	1874
TURKISH Forces, The, and the Military Aspects of the Eastern Question	Vincent, O. E. H., Lieut.-Col. Central London Rifle Rangers	XX 86 346	1876
TURRET, The, <i>versus</i> the Broadside System, <i>with plates</i>	Coles, Cowper, P., Capt. R.N., C.B.	XI 46 434	1867
— Ships, Armoured, The Conversion of our Screw Line of Battle Ships into, <i>with plates</i>	Henwood, Chas. F.	XIII 54 181	1869
U.			
UMBRELLA Campaign, The, <i>with plate</i>	Fosbery, G. V., Maj., B.C., H.M. Bengal Staff Corps	XI 47 548	1867
UNSURVEYED World, The, in 1874, <i>with map</i>	Hull, T. A., Staff-Comr.	XIX 80 48	1875
V.			
VANCOUVER'S Island and British Columbia, Report of a Reconnaissance of the North-West Provinces and Indian Territories of the Dominion of Canada, and Narrative of a Journey across the Continent through Canadian Territory to	Robertson-Ross, P., Col.	XVII 74 543	1873
VENTILATION of Ships, especially of Low Freeboard and Hospital Ships, <i>with plates</i>	Macdonald, J. D., M.D., Staff-Surgeon R.N.	XVIII 76 136	1874
VERSAILLES, The position and Lines of Defence of the 5th Corps before, during the Winter of 1870-71	Walker, Beauchamp, Major-Gen., Military Attaché, Berlin	XV 65 806	1871
"VICTOR Emanuel," H. M. S., as an Hospital Ship during the late Ashantee Campaign, <i>with plate</i>	Ryder, A. P., Vice-Admiral	XVIII 78 383	1874
VOLTA Expedition, The, during the Ashanti Campaign, <i>with map</i>	Glover, Sir John H., G.C.M.G., Capt. R.N.	XVIII 78 317	1874
VOLUNTEERS, The recent War, with reference to (Special Lecture to Officers of Volunteers)	Homa, R., Capt. R.E., &c.	Special No. } p.61	1873

SUBJECT OF LECTURE OR PAPER.	NAME OF AUTHOR.	Vol., No., and Page of Journal.	Year.
W.		Vol. No. P.	
WAR Vessels for the British Navy, The Best Types of.—(The Naval Prize Essay, 1876), <i>with plates</i>	Noel, Gerald N., Comr. R.N.	xx 86 253	1876
WAR-FORCES, Distribution of, <i>see Forces</i> .			
WARFARE, Defensive Submarine, <i>with plate</i>	Stotherd, R. H., Maj. R.E.	xv 65 705	1871
——— Savage, Experience in, <i>with map</i> .	Baker, Sir Samuel White, Kt.	xvii 75 904	1873
——— and British Troops, with Special Reference to the Kafir Wars, <i>with map</i>	Gawler, Col., late 73rd Regt.	xvii 75 922	1873
——— Primitive, Section I., <i>with plates</i> .	Fox, A. H. Lane, Col. late Grenadier Guards	xi 47 612	1867
——— Section II. ; on the Resemblance of the Weapons of Early Races, their Variations, Continuity, and Development of Form, <i>with plates</i>	" "	xii 51 399	1868
——— Section III. ; Metal Period, <i>with map and plate</i>	" "	xiii 56 509	1869
WARNING Voice from the Spanish Armada, <i>see also Spanish Armada</i> .	Collinson, T. B. Maj.-Gen. R.E.	xix 81 285	1875
——— Voice, Another, from 1805, <i>with map</i>	" "	xx 85 1	1876
WEATHER Intelligence and Storms in the British Islands, Telegraphic, <i>with plate</i>	Scott, Robert H.	xiii 54 287	1869
WHITE'S Porte-Knapsack, <i>with illustration</i>	White, Wm., ..	xvi 69 747	1872
WINDS of the North Atlantic, <i>with plates</i>	Toynbee, H., Capt.	xv 64 567	1871
WORLD, Unsurveyed, The, 1874, <i>with map</i>	Hull, T. A., Staff- Comr. R.N.	xix 80 48	1875
WÜRT, The Battle of, <i>with maps</i> ..	Collen, E. H. H., Lieut. R.A.	xvii 73 426	1873
WOUNDED in War, Aid to the Sick and ..	Loyd-Lindsay R. J., Lieut.-Col., F.C., M.P.	xv 64 381	1871
——— Societies for aid to	Furley, John ..	xx 88 632	1876
——— in time of War, Assistance to the, <i>with illustrations</i>	Moore, Sandford, Surgeon, M.B.	xx 88 658	1876
WRECKS, The Destruction of, under Water,	Jekyll, Herbert, Lieut. R.E.	xiii 55 395	1869

INDEX OF AUTHORS.

NAME OF AUTHOR.	SUBJECT OF LECTURE OR PAPER.	Vol. and No. of Journal.	Year.
A.			
ABEL, F. A., F.R.S.	Explosive Agents applicable to Naval and Military Purposes as Substitutes for Gunpowder	xvi. 68	1872
ABNEY, W. de W., Capt. R.E. (School of Military Engi- neering, Chatham)	On Magneto-Electric Light	xx. 86	1876
ADAIR, R. A. Shafto, Col. F.R.S., A.D.C. to the Queen	The Communications, Commercial and Military, between the Steppes of Central Asia and Hindustan	xi. 45	1867
" "	The Strategy of Invasion, as exemplified in the American and Austro-Prussian Wars and in the War of Metz, with Remarks on Centres of Defence and the Training of National Forces	xvi. 67	1872
ADAMS, A. Leith, M.D., Surg.-Major London Recruiting District	The Recruiting Question, from a Military and a Medical point of View	xviii. 76	1874
AIKMAN, F. R., Lt.- Col., U.C.	Aikman's Instruction-Rifle and Prac- tice Tester for Ordnance	xv 117	1871
ANDREW, W. P., F.R.G.S.	The Euphrates Valley Route to India, in connection with the Central Asian Question	xvii 324	1873
ARDAGH, J. C., Capt. B.E., F.R.G.S.	The Comparative Cost of the Armies of different Nations, and the Loss to a Country by Conscription	xx 128	1876
ARTHUR, Capt., R.N.	Description of a Registering Compass ..	xiv 257	1870

NAME OF AUTHOR.	SUBJECT OF LECTURE OR PAPER.	Vol. & No. of Journal.	Year.
B.			
BAILLIE, J., Lt.-Col. H.M. Bengal Staff Corps	Photography applied to Military Science	XIII. 56	1869
BAKER, Valentine, Col., late 10th Hussars	Organization and Employment of Ca- valry, with Discussion on ditto	XVII. 73	1873
" "	The Military Geography of Central Asia	XVIII. 79	1874
BAKER, Sir Samuel White, Pacha, M.A. F.R.S., F.R.G.S.	Experience in Savage Warfare	XVII. 75	1873
BALE, Lieut. 1st W. I. Regt.	Extracts from a Report on Orange Walk, New River, as a Military Position for the Protection of British Interests in Honduras, with Notes and Experiences on Out-Post Duty in the Bush	XVII. 75	1873
BALFOUR, G., Maj.- Gen. R.A., C.B.	The Constitution, Composition, and Re- cruiting of the French Army	XI. 47	1867
BARNABY, Nathaniel, Assist.-Constructor of the Navy	Modern Ships of War as Illustrated by the Models in the Institution	XVI. 66	1872
BARNABY, Nathaniel, Chief Naval Con- structor Admiralty	Lessons from the Hotspur-Glatton Ex- periments	XVII. 72	1872
BARTELS, <i>see</i> SCHNAC- KENBURG.			
BEAL, Rev. S., R.N.	Description of a Model of a Chinese Torpedo	XV. 65	1871
BRAZLEY, G. G., Capt. 83rd Regt.	Suggestions for the Land Transport- Service of the Army	XIII. 56	1869
BRAZLEY, Alex. ..	Coast Fog-Signals.	XVI. 69	1872
BELL, T. Lynden, Major 1st Batt. 6th Regt.	Movements, &c., of Light Infantry ..	XIV. 61	1870
BESSEMER, H. ..	On the Accurate Firing of Naval Ord- nance by means of the Vessel's Motion	XVII. 75	1873
BEVAN-EDWARDS, G., Major R.E.	An Organization for the Army of Eng- land	XII. 50	1868

NAME OF AUTHOR.	SUBJECT OF LECTURE OR PAPER.	Vol. & No. of Journal.	Year.
BIGGE, T. S., Major 5th Fusiliers	Proposed Formation of a Battalion for the Attack	XVIII. 76	1874
BLAKE, G. Frederic, Captain R.M.	Military Law	XI. 47	1867
BLOM, T. A., Chief Constructor, Nor- wegian Navy	Practical Method of Finding a Ship's Metacentre at great Angles of Inclination	XVII. 73	1873
BOWER, Graham, Lieut. R.N.	A New System of Naval Tactics ..	XIX. 82	1875
BOYLE, R. H., Com- mander R.N.	H.M. Ship Agincourt on and off the Pearl Rock	XVI. 67	1872
BRACKENBURY, H., Capt. R.A. (Pro- fessor of Military History, Royal Mi- litary Academy, Woolwich	The Last Campaign of Hanover.. ..	XIV. 58	1870
" "	The Tactics of the Three Arms, as Modified to Meet the Requirements of the Present Day	XVII. 74	1873
BRACKENBURY, C. B., Capt. R.A.	The Military Systems of France and Prussia in 1870	XV. 63	1871
" "	The Winter Campaign of Le Mans ..	XV. 64	1871
" "	The Autumn Manœuvres of England ..	XVI. 67	1872
" "	Autumn Manœuvres of 1872	XVII. 71	1873
BRACKENBURY, C. B., Major R.A.	The Intelligence Duties of the Staff Abroad and at Home	XIX. 81	1875
BRACKENBURY, C. B., Lt.-Colonel R.A., A.A.G., G.O.G.I.	The Tactical Power of Modern Field Artillery	XX. 86	1876
BRASSEY, THOS., M.P.	Naval Reserves	XVII. 73	1873
" "	How Best to Improve and Keep up the Seamen of the Country	XX. 85	1876
" "	The Mercantile Marine considered as an Auxiliary to the Royal Navy	XX. 87	1876
BREMNER, Geo., Capt.	Bremner's Steam Steering Screw ..	XVII. 70	1873
BRENT, H. W., Com. R.N.	Fog Signals in Fleets	XV. 63	1871

NAME OF AUTHOR.	SUBJECT OF LECTURE OR PAPER.	Vol. & No. of Journal.	Year.
BRENT, H. W., Com. R.N.	Three Years with the Royal Naval Reserve	XVIII. 78	1874
BRIDGE, Cyprian A. G., Comr. R.N.	Fleet Evolutions and Naval Tactics ..	XVII. 72	1873
" "	An Account of the Chinese Naval Arsenal at Foo-chow, Translated and Abridged from M. Giquel's Pamphlet	XX. 88	1876
BROOKE, Chas. K., Capt. 15th Regt.	Proposed Alterations in the Annual Musketry Practice, so as to bring it into accordance with the Infantry Tactics of the Day	XIX. 80	1875
BROWNE, C. Orde-, see ORDE-BROWNE			
BROWNE, Edmond, Capt. 21st Royal N. B. Fus.	Upper Burmah, its Defences and War-like Resources	XIX. 83	1875
BUCKNILL, J. T., Lieut. R.E.	Propositions in connection with Diving Apparatus	XV. 65A	1871
" "	Description of the Torpedo Boats "Fortune" and "Triana," United States Navy	XVII. 73	1873
BURNABY, F.G., Capt. Roy. Horse Guards	The Practical Instruction of Staff Officers in Foreign Armies	XVI. 68	1872
C.			
CAMPBELL, George, Bengal Civil Service	The North-West Frontier of India ..	XIII. 54	1869
CAMPBELL, J. R., Capt. Hants Militia Artillery	Campbell's Range-Indicator	XVI. 67	1872
" "	Erratum ditto ditto	XVI. 68	1872
CARMICHAEL, L. M., Capt. 5th Royal I. Lancers	Artillery Fire in Peace Manœuvres ..	XVIII. 78	1874
CARPENTER, William, M.D., LL.D., F.R.S.	The Voyage of H.M.S. Challenger ..	XVII. 75	1873
" "	Ditto ditto continued	XIX. 84	1875
CASTLE, W. M. F., Lieut. R.N.	The Game of Naval Tactics	XVII.	1873

NAME OF AUTHOR.	SUBJECT OF LECTURE OR PAPER.	Vol. & No. of Journal.	Year.
CHADWICK, Edwin, C.B.	The military and naval Force derivable from the Introduction of Military Drill and Gymnastic Exercises, as part of a National System of Education into all Elementary Schools	XIV. 59	1870
CHAUMONT, see DE CHAUMONT			
CHESNEY, C. C., Lt.- Col. R.E.	The Study of Military Science in time of Peace	XV. 63	1871
" "	The Theory and Practice of Peace-Manœuvres, with their Relation to Real Warfare	XVI. 68	1872
CLANCHY, H. T., Lieut. R.N.	Our Naval Officers and the Public Services: Proposed Employment of Her Majesty's Ships and Naval Officers in connection with the Mail and Troop Services combined	XV. 65	1871
CLARKE, Hyde ..	The Military Advantages of a Daily Mail Route to India through Turkey and the Persian Gulf	XII. 49	1868
CLARKE, E. Podmore, Capt.	Military Model Apparatus	XIX. 81	1875
CLARKE, F. C. H., Captain R. A., D.A.Q.M.G.	Recent Reforms in the Russian Army ..	XX. 86	1876
CODRINGTON, Sir Wil- liam J., Gen., G.C.B.	Autumn Manœuvres Abroad and at Home, 1869-70	XVI. 68	1872
COLES, Capt. Cowper P., C.B., R.N.	The Turret <i>versus</i> the Broadside System	XI. 46	1867
COLLEN, E. H. H., Lieut. R.A.	On Military Transport and Supply in India	XVI. 68	1872
" "	The Battle of Wörth	XVII. 73	1873
COLLEY, G. P., Major 2nd Queen's, Pro- fessor of Military Administration and Law, Staff College, Sandhurst	Marches	XVII. 70	1873
COLLINSON, T. Ber- nard, Col. R.E.	A Proposition for one General Military School for the Army	XIII. 54	1869
COLLINSON, T. B., Maj.-Gen. R.E.	The Strategical Importance of the Military Harbours in the British Channel as connected with Defensive and Offensive Operations	XVIII. 77	1874

INDEX OF AUTHORS.

NAME OF AUTHOR.	SUBJECT OF LECTURE OR PAPER.	Vol. & No. of Journal.	Year.
COLLINSON, T. B., Maj.-Gen. R.E.	A Warning Voice from the Spanish Armada	XIX. 81	1875
" "	Another Warning Voice from 1805 ..	XX. 85	1876
" Sir Richard, Vice-Admiral, K. C. B., (Elder Brother of the Trinity House)	Some Account of the Observations recently made by the Corporation of the Trinity House on Fog Signals	XIX. 82	1875
COLOMB, P. H., Com- mander R.N.	Lessons from Lissa	XI. 43	1867
" "	The Naval Department of the French International Exhibition of 1867	XII. 48	1868
" "	The Earl of Caithness's Gravitating Compass, and Nunn's Improved Bin- nacle Lights	XII. 49	1868
" "	Signal Lights of Captains Colomb and Bolton	XII. 50	1868
COLOMB, P. H., Capt. R.N.	The Attack and Defence of Fleets, Pt. I.	XV. 64	1871
" "	Ditto ditto Part II.	XVI. 66	1872
" "	The Lighting of H.M. Ships	XVI. 68	1872
COLOMB, J. C. R., Capt. Royal Marine Artillery	The Distribution of our War Forces ..	XIII. 53	1869
" "	General Principles of Naval Organiza- tion	XV. 64	1871
" "	Ditto Military Organization	XV. 64	1871
COMMERELL, Sir J. E., F.C., K.C.B., Capt. R.N.	Explanation of a Jury-Rudder invented by him	XIX. 84	1875
COODE, Sir John, Kt., O.E.	On Military or Strategic and Refuge Harbours	XIX. 81	1875
CROFT, J. M'Grigor, M.D., M.R.C.P.	The Fish-Tail Rudder for all Classes of Vessels	XIV. 57	1870
CROUDACE, W. S., Mercantile Marine	Croudace's New Book of Stellar Azimuth Tables; a Newly-Invented Illu- minated Stellar Azimuth Compass; and Croudace's Ordnance Night Sight- Vane or Collimator	XVIII. 77	1874

NAME OF AUTHOR.	SUBJECT OF LECTURE OR PAPER.	Vol. & No. of Journal.	Year.
CUNNINGHAM, H. D. P., Major 3rd Hants Artillery Volunteers	Working Heavy Guns and Projectiles ..	XIV. 57	1870
CUNYNGHAME, Sir A., General, K.C.B.	The Eastern Caucasus and Daghestan ..	XVII. 75	1873
D.			
DAVIDSON, D., Lieut.- Colonel	The Use of the Collimator for Laying Guns for Night Firing	XIII. 55	1869
DAVIS, J. E., Capt. R.N.	Extracts from a Paper read at the British Association for the Advance- ment of Science, at Bradford, on the Scientific Voyage of the "Challenger"	XVII. 75	1873
DAWSON, Wm., Comr. R.N.	Offensive Torpedo Warfare	XV. 62	1871
" "	Naval Guns	XVI. 68	1872
" "	On Mounting and Working Heavy Guns at Sea	XVI. 68	1872
" "	Powder Pressures in the first 35-ton Gun	XVII. 70	1873
DE CHAUMONT, F., M.D., Army Medi- cal School, Netley	Military Hygiene	XIV. 59	1870
DE FONBLANQUE, E. B., Deputy Com- missary-General	Reforms in Army Administration ..	XIII. 53	1869
" "	The Control Service, with Practical Sug- gestions for its Improvement, &c.	XVI. 66	1872
DILLON, Conrad A., Capt.	The Chobham Bedstead	XVI. 66	1872
DOTY, H. H., Capt...	The Spakowsky Marine and Army Night-Telegraph	XI. 47	1867
DOUGALL, James D.	Shültze's Granulated-wood Gunpowder	XII. 48	1868
DRAKE, Mervin, Capt. R.E.	The Government Breech-Loading Rifles of France, Prussia, and England	XV. 64	1871
DREW, Andrew A.W., M.A.	The Working of Heavy Broadside Guns	XI. 43	1867
DYER, Hugh M'Neil, Capt. R.N.	British Interference with Revolted Spanish Ships in 1873	XVIII. 77	1874

NAME OF AUTHOR.	SUBJECT OF LECTURE OR PAPER.	Vol. & No. of Journal	Year.
E.			
EAST, C. J., Brevet-Major 41st Regt.	An Account of the Proceedings of the Chittagong Column of the Lushaie Expeditionary Force 1871-72	XVII. 71	1873
ECKERSLEY, E., Chief Engineer R.N.	Methods of Ascertaining the Relative Value of Coals for Naval Purposes	XIX. 84	1875
EDDY, Charles B., M.A.	Moveable Steel Mantlet for the Protection of Artillery and Troops	XIII. 55	1869
EDWARDS, see BEVAN-EDWARDS			
ELDER, John ..	Circular Ships of War, with Immersed Motive Power	XII. 52	1868
ELLIOT, G., Vice-Admiral	The Hydraulic Propeller as a Motive Power for Ships	XI. 47	1867
ENGLISH, T., Lieut. R.E.	Observations on the Moncrieff System of Mounting Ordnance	XVII. 74	1873
EVANS, F. J., Staff Capt. R.N., F.R.S.	The Present State of our Knowledge regarding the Magnetism of Iron Ships	XVI. 66	1872
EYRE, Vincent, Maj.-General, C.B., R.A.	The Sikh and European Soldiers of our Indian Forces	XI. 43	1867
F.			
FAWCETT, R. H., Capt. 33rd Regt.	An Occasional Note on the Use of the Aneroid Barometer in Surveying	XVI. 66	1872
FINDLAY, A. G., F.R.G.S.	Ocean Currents and their Influences ..	XIV. 58	1870
FISHBOURNE, E. Gardiner, Rear-Admiral, C.B.	On the Causes of the Insufficient Stability of H.M.'s late Turret Ship "Captain" and of other Ironclads	XV. 62	1871
FISHER, Colonel A. a'Court, C.B., R.E.	Gun-Cotton applied to Demolitions ..	XIV. 60	1870
FLETCHER, H. C., Lt.-Colonel Scots Fusilier Guards	The Employment of Mitralleurs during the Recent War and their Employment in Future Wars	XVI. 66	1872
FOLKARD, A., M.I.C.E.	Improvements in Apparatus for Lowering and Raising, Engaging and Disengaging Ships' Boats	XVIII. 77	1874

NAME OF AUTHOR.	SUBJECT OF LECTURE OR PAPER.	Vol. & No. of Journal.	Year.
FONBLANQUE, see DE FONBLANQUE			
FOSBERRY, G.V., Maj., B.C., H.M. Bengal Staff Corps	The Umbeyla Campaign	XI. 47	1867
" "	Explosive Bullets and their Application to Military Purposes	XII. 48	1868
" "	Mitrailleurs and their Place in the Wars of the Future	XIII. 56	1869
Fox, A. H. Lane, Colonel late Gren- adier Guards	Primitive Warfare, Section I. .. .	XI. 47	1867
" "	" " Section II.; on the Resemblance of the Weapons of Early Races, their Variations, Continuity, and Development of Form	XII. 51	1868
" "	" " Section III.; Metal Period	XIII. 56	1869
Fox, L. Loftus B., Capt. Royal Long- ford Rifles	Our First Reserve	XIII. 53	1869
Fox, T. W., Surgeon- General R.E.	The Medical Department of the German Army in Peace and War	XX. 87	1876
FROUDE, William, M.A., F.R.S.	Apparatus for Automatically Recording the Rolling of a Ship in a Sea-way and the Contemporaneous Wave Slopes	XVII. 75	1873
FURLEY, John ..	The Convention of Geneva and National Societies for Aid to Sick and Wounded Soldiers in War	XX. 88	1876
G.			
GARDNER, G. H., Capt. R.N.	The Formation of Reserves of Officers and Seamen for the Royal Navy, and the Evils and Inadequacy of Impress- ment to provide the same	XV. 65	1871
GATLING, R. J. ..	Machine Guns:—the Gatling Battery, the Agar and Claxton Guns, the French and Montigny Mitrailleurs	XIV. 60	1870
GAWLER, Col., late 73rd Regt.	British Troops and Savage Warfare, with Special Reference to the Kaffir Wars	XVII. 75	1873
GILMORE, A. H., Lieut. R.N.	Expanding Shot Plug; Expanding Sponge for Artillery Practice and Anti-Torpedo Vessel	XIII. 53	1869

NAME OF AUTHOR.	SUBJECT OF LECTURE OR PAPER.	Vol. & No. of Journal.	Year.
GILMORE, A. H., Commander R.N.	Gilmore's Safety Lamps for Mines and Ships	XIV. 59	1870
GLOVER, Sir John H., G.C.M.G., Capt. R.N.	The Volta Expedition during the Ashanti Campaign	XVIII. 78	1874
GOLDSMID, Sir Frederic J., Colonel, C.B., K.C.S.I.	Certain Roads between Turkestan and India, independent of the Oxus or of any Oxus Boundary	XVIII. 79	1874
GOLDSMID, Sir Frederick J., Major-Gen., C.B., K.C.S.I.	Journeys from Herat to Khiva	XIX. 80	1875
" "	Military Training, a Means of Administrative Power and of Political Usefulness	XX. 87	1876
GOODE, Samuel ..	Mance's Heliograph, or Sun Telegraph..	XIX. 83	1875
GOODENOUGH, James G., Capt. R.N.	The Preliminary Education of Naval Officers	XV. 64	1871
GOWEN, John E., Col. United States Army	Ship Raising, especially with Reference to his Experience in Raising the Russian Ships sunk in the Harbour of Sevastopol	XIII. 55	1869
GRAHAM, Gerald, F.C., C.B., Col. R.E.	Shelter Trenches or Temporary Cover for Troops in Position	XIV. 60	1870
GRAHAM, Sir Lumley, Bart., Col.	The Company as a Military Body; its Establishment, and the Best Number of Companies in the Battalion	XIX. 83	1875
" "	The Austrian Army in 1875	XX. 87	1876
GREENFELL, H. H., Lieut. R.N.	Note on Aligning the Sights of Ordnance when Laying for an Object	XVII. 74	1873
GRIFFITHS, R., C.E.	Bow and Stern Screw Steamships ..	XVII. 74	1873
" "	Further Experiments with his Bow and Stern Screw Propeller	XVIII. 77	1874
" "	On the Casing of the Propeller of H.M.S. "Bruiser"	XX. 86	1876
" "	On the Best Method of Propelling Steam Ships, so as to give the Greatest Facility for Manœuvring in Action, and for Avoiding Collisions at Sea	XX. 88	1876
GUN, H. A., Captain R.E.	Manteuffel's Campaign in the East of France	XVII. 72	1873

NAME OF AUTHOR.	SUBJECT OF LECTURE OR PAPER.	Vol. & No. of Journal.	Year.
H.			
HALE, Lonsdale A., Major R.E. (In- structor in Military History, Naval En- gineer Establish- ment, Chatham)	The Study of Military History by the Regimental Officers of the Army	XX. 87	1876
" "	The New French Infantry Tactics ..	XX. 87	1876
HAMILTON, J. Ran- dolph (late C. S. Navy)	The American Navy; its Organization, Ships, Armament, and Recent Ex- periences	XII. 49	1868
HAMILTON, Mark, B.A., M.D., Sur- geon R.N.	Improved Life-Buoys, and a System of Deck-Rafts for Saving Life at Sea	XVII. 74	1873
HARCOURT, Vernon, Esq., Q.C., M.P.	Our Naval and Military Establishments regarded with reference to the Dan- gers of Invasion	XVI. 68	1872
HAY, Sir John C. D., Bart., C.B., M.P., F.R.S.	The Launch of H.M.S. "Northumber- land"	XIII. 56	1869
HEATHORNE, T. B., Capt. (h.p.), R.A.	Muzzle-Pivoting Gun-Carriages; Lever, Fulcrum, and Incline Plane Principle	XII. 49	1868
HELVIG, Hugo ..	Tactical Examples	XX. 86	1876
HENWOOD, Charles F., Naval Architect	The Conversion of our Screw Line of Battle Ships into Armoured Turret Ships	XIII. 54	1869
" "	Ironclads, Present and Future	XIV. 58	1870
HILDYARD, H., Lieut. 72nd Highlanders	The Autumn Manœuvres of the Prussian Guard Corps in September, 1872	XVI. 69	1872
HILL, E. J.	Hill's Boat Lowering and Self-Detach- ing Apparatus	XVI. 69	1872
HIME, H. W. L., Capt. R.A., F.S.S. (R. A. Institution Gold Medallist)	Universal Conscription the Only Answer to the Recruiting Question.—(The Institution's Military Prize Essay, 1875)	XIX. 80	1875
HOLMES, Nathaniel, Electrical Engineer	Holmes's Storm and Signal Lights ..	XVI. 66	1872
HOME, R., Captain, R.E.	The recent War, with reference to the Militia and Volunteers (Lecture to Officers of Volunteers)	Special No.	1873
" Lieut.-Col., C. B., R. E., D.A.Q.M.G.	On the Organization of the Communica- tions of an Army, including Railways	XIX. 82	1875

NAME OF AUTHOR.	SUBJECT OF LECTURE OR PAPER.	Vol. & No. of Journal.	Year.
HOPKINS, Evan, C.E., F.G.S.	The Demagnetization of Iron Ships and of Iron Beams, &c., of Wooden Vessels, to Prevent the Deviation of the Com- passes, Experimentally Shown by means of a Model	XI. 44	1867
HOSEASON, J.C., Capt. R.N.	The Necessity for an Increase in our Naval Steam Transport Fleet for Military Purposes	XIV. 61	1870
HOTZE, see MARTINI.			
HOWLETT, Samuel B. (late War Office)	Construction of Boots and Shoes Suit- able for the Army, Police, and others subject to Severe Walking	XII. 48	1868
HOZIER, H. M., Capt.	The Employment of Cavalry in War ..	XVI. 67	1872
" "	The Breeding of Horses for Military Purposes	XVI. 69	1872
HULL, T. A., Staff Commander R.N.	Practical Nautical Surveying	XVI. 69	1873
HULL, T. A., Staff Commander R.N. (Superintendent of Charts, Admiralty)	The Unsurveyed World in 1874 ..	XIX. 80	1875
HUTCHINSON, W. N., Lieut.-General	A Light Short Gun, throwing a Heavy, Sharp - Edged, Discoidially - Formed Projectile	XI. 43	1867
" "	Recoil Utilized	XIII. 53	1869
HUTCHINSON, A. H., Major R. A., F.R.G.S., &c.	Improved Instruments for Military Sketching	XVII. 70	1873
HUYSHZ, G. L., Capt. Rifle Brigade	The Red River Expedition	XV. 62	1871
HYDE, J. M... ..	Deflecting Armour-Plated Ships for Coast Defence	XIII. 53	1869
I.			
INGLEFIELD, E. A., Capt. R.N., F.R.S.	Naval Tactics	XII. 51	1868
" "	Inglefield's New Hydraulic Steering Apparatus, as being fitted to H.M.S. "Achilles"	XIII. 53	1869

NAME OF AUTHOR.	SUBJECT OF LECTURE OR PAPER.	Vol. & No. of Journal.	Year.
INGLEFIELD, E. A., Rear-Adml., F.R.S.	Means of Screw-Ship Steerage, and a Description of the Hydrostatic Steering Gear fitted on board H.M.S. "Achilles," with the Results of Experiments at Sea; also a Plan of Apparatus fitted on board the Turkish Ironclad "Fethi-Bulend"	XIV. 57	1870
INNES, Alex., Major Aberdeen Artillery Volunteers	Innes's Self-Acting Gun-Carriage, with Elevating Mantelet	XIX. 82	1875
J.			
JAMES, Wm., late 42nd Highlanders	A Method of Converting the Regulation Bell Tent into a Shelter Tent, with a New Arrangement for Entrenching Tools	XVI. 67	1872
JAMES, W. H., Lieut. R.E., F.G.S.	Notes on Field Guns	XX. 87	1876
JEKYLL, Herbert, Lieut. R.E.	The Destruction of Wrecks under Water	XIII. 55	1869
JENSEN, Peter	Steenstrup's Conical Screw and Breech-Loading Cannon	XIV. 57	1870
JERVOIS, W. Drum- mond, C.B., Col. R.E., Deputy Di- rector of Works for Fortifications	Coast Defences, and the Application of Iron to Fortifications	XII. 52	1868
JONES, Alfred S., W.C., Major, Adj. Staff College, Sand- hurst	The Education of Staff Officers	XIV. 59	1870
JONES, Lieut.-Col., W.C., Adjutant Staff College, Sand- hurst	Ride and Tie Patrolling, and Section-Skirmishing	XVI. 66	1872
JONES, E. M., Major 20th Regiment	The Latest Changes made by the Prussians in their Infantry Drill Book	XVI. 68	1872
K.			
KNOLLYS, W. W., Major 93rd Highl., Garrison Instruc- tor, Home District	Disembarkations (Lecture to Officers of Volunteers)	Special No.	1873

NAME OF AUTHOR.	SUBJECT OF LECTURE OR PAPER.	Vol. & No. of Journal.	Year.
L.			
LACON, W. Stirling..	The Rule of the Road at Sea, or the Steering and Sailing Rules	XVI. 67	1872
" "	Lowering Boats at Sea	XVII. 71	1873
LAMPREY, J., M.B., F.R.G.S., Surgeon 67th Regiment	The Economy of the Chinese Army ..	XI. 46	1867
LATHAM, John, F.S.A.	The Progress of Breech-Loading Small Arms	XIX. 83	1875
LAUDERDALE, Adml. the Earl of, G.C.B.	The Best Mode of Defence of the Protected Territories on the Gold Coast of Africa, and the Organization of a Force Sufficient for that Purpose	XVII. 74	1873
LAUGHTON, J. K., M.A., R.N., Mathe- matical and Naval Instructor, Royal Naval College, Greenwich	Ocean Currents	XV. 65	1871
" "	The Scientific Study of Naval History ..	XVIII. 79	1874
" "	Scientific Instruction in the Navy ..	XIX. 81	1875
LEAHY, Arthur, Major R.E.	Army Organization: our Infantry Forces and Infantry Reserves	XII. 50	1868
LEAHY, Arthur, Lieut.-Col. R.E.	The Organization of our Military Forces	XV. 63	1871
" "	Military Bridge Construction	XIX. 84	1875
LINDSAY, Charles, Lieut. R.N.	Plan for Protecting Ships (at anchor) Blockading a Port from Attacks by Outrigger, Whitehead, or Harvey Torpedoes	XIX. 82	1875
LIVESAY, R. A. E., Capt. R.E.	The New French Rifle	XX. 86	1876
LOYD LINDSAY, R. J., B.C., Lieut.- Colonel, M.P.	Aid to the Sick and Wounded in War ..	XV. 64	1871

NAME OF AUTHOR.	SUBJECT OF LECTURE OR PAPER.	Vol. & No. of Journal.	Year.
LOHLEIN, Ludwig, late Captain 1st Baden Body Guard Grenadier Regt.	Campaign of 1870-71, &c.—(Notice of book)	XX. 88	1876
LONGMORE, T., C.B., M.D., Dep. I. G. Hospitals	The Geneva Convention of 1864, in Relation to Aid afforded by Volunteer Societies to Sick and Wounded Soldiers during the late Franco- Prussian War, &c.	XVI. 67	1872
LORD, W. B. (h.p.), R.A.	Description of a New Filter	XII. 51	1868
LUARD, C. E., Capt. R.E.	Field Railways and their General Appli- cation in War	XVII. 74	1873
LUMLEY, Henry, Assoc. I.N.A.	Lumley's Patent Rudder	XIV. 57	1870
M.			
MACDONALD, J. D., M.D., F.R.S., R.N., Staff-Surgeon (Pro- fessor of Naval Hygiene, Army Medical School, Netley)	Ventilation of Ships, especially of Low Freeboard and Hospital Ships	XVIII. 76	1874
MACKAY, James ..	The Mackay Gun and Projectiles ..	XII. 50	1868
MACKIE, Samuel J., Assoc. Inst. C.E.	The National Defences of Great Britain, Especially with Reference to the Future Requirement of Floating Forts	XII. 49	1868
„ „	Summary of the Experiments at Shoe- buryness during the year 1868-69	XIII. 55	1869
MACLEAN, W. C., M.D., C.B., Sur- geon-General (Pro- fessor of Military Medicine, Army Medical School, Netley)	Sanitary Precautions to be Observed in the Moving and Camping of Troops in Tropical Regions, &c.	XVIII. 76	1874
MACOMBER, D. O., C.E.	The Macomber Gun	XIX. 81	1875
MAGREGOR, John, M.A.	On Training Boys for Soldiers	XIX. 82	1875

NAME OF AUTHOR.	SUBJECT OF LECTURE OR PAPER.	Vol. & No. of Journal.	Year.
MAITLAND, E., Major R.A. (Assist. Sup. Royal Gun Fac- tories, Woolwich)	Fog Signalling by Explosives .. .	XIX. 82	1875
MAJENDIE, V. D., Capt. R.A., Assist- ant Superintendent Royal Laboratory, Woolwich	Military Breech-Loading Small Arms ..	XI. 44	1867
" "	The Martini-Henry Rifle	XIII. 55	1869
MALET, H., Lt.-Col. Gren. Guards	Our Reserve Forces	XIII. 54	1869
MARTIN, T., Lt.-Col. (late 4th K. O. R. Regiment)	Ammunition Supply Car, Skeleton Am- munition Car, Packing Ammunition, &c.	XIII. 55	1869
MARTINI and HOTZE	The Swiss Military System	XV. 64	1871
MAURICE, J. F., Lt. R.A., Professor of Tactics, R.M. Coll., Sandhurst	The Connection between the Ordinary Work of Soldiers in Peace-Time and Warlike Efficiency (Lecture to Officers of Volunteers)	Special No.	1873
MAXWELL, H. H., Colonel R.A.	The Field Gun for India.. ..	XIV. 58	1870
MIDDLETON, F. D., Lt.-Col., Superin- tending Officer of Garrison Institu- tions	The Education of the Army with Re- ference to Young Officers	XV. 65	1871
" "	Changes of Tactics consequent on the Improvement of Weapons, &c. (Lec- ture to Officers of Volunteers)	Special No.	1873
MONCRIEFF, Alexan- der, Captain Edin- burgh Artillery Militia	Further Particulars Regarding Mon- crieff's Protected Barbette System	XI. 44	1867
" "	The Progress that has been made in the Application of the Moncrieff System to Garrison, Siege, and Naval Or- nance, and to Coast Works	XIV. 59	1870
MONCRIEFF, Alexan- der, Major, F.R.S.	Further Observations on the Moncrieff System of Mounting Ordnance	XVII. 74	1873
"	On Harbour Defence	XIX. 81	1875

NAME OF AUTHOR.	SUBJECT OF LECTURE OR PAPER.	Vol. & No. of Journal.	Year.
MOORE, Arthur, Lieut. R.N.	Proposed Plan of Canvas Pontoons to be made out of Ships' Stores	XIX. 84	1875
MOORE, Sandford, Surgeon, M.B., F.S.S. (Instructor, Army Hospital Corps)	Assistance to the Wounded in Time of War	XX. 88	1876
MORGAN, J. P., Capt. R.A.	A Proposal for a very Heavy Breech- Loading Gun of Novel Construction	XIV. 60	1870
" "	The Determination of the Explosive Force of Gunpowder	XV. 64	1871
" "	Rifling for Heavy Guns	XVII. 74	1873
MORGAN, J. P., Major R.A. (Assist. Super. Royal Gunpowder Factory, Waltham Abbey)	Recent Improvements in the Manufac- ture of Pebble Powder	XVIII. 77	1874
" "	Breech-Loading and Muzzle-Loading for Guns	XVIII. 78	1874
" "	Some Special Features in Large and Small Grain Powders	XX. 86	1876
MORIARTY, H. A., C.B., Staff-Com- mander R.N.	The Atlantic Telegraph Cables of 1857- 58, also those of 1865-66	XI. 44	1867
MOUAT, F. J., Sur- geon-Major, M.D., F.R.C.S.	A Visit to Some of the Battle Fields and Ambulances of the North of France	XV. 64	1871
MURRAY, Andrew, C.B.	The Turbine Propeller	XV. 65	1871
N.			
NAPIER, the late Sir Chas. J., G.C.B., Lt.-Gen.	Note on the Battle of Thrasymene ..	XVIII. 78	1874
NEWDIGATE, E., Col.	Prussian Drill, 1876	XX. 88	1876
NICOLSON, Sir Fredk. W. E., Bart., C.B., Vice-Admiral	A Few Notes on Captain Dyer's Paper.— (See DYER)	XVIII. 77	1874

NAME OF AUTHOR.	SUBJECT OF LECTURE OR PAPER.	Vol. & No. of Journal.	Year.
NOAKE, R. C., Capt. and Adj. Scottish Borderers Militia	The Best Mode of Recruiting for the Army, and the Influences bearing upon that Service	XI. 43	1867
NOEL, Gerard H. U., Comr. R.N.	The Best Types of War Vessels for the British Navy. — (The Naval Prize Essay, 1876)	XX. 86	1876
NOLAN, John Philip, Capt. R.A.	Ranges and Nolan's Range Finder ..	XIV. 57	1870
O.			
O'HEA, J. B., Capt. late 25th Regt.	Cartridges for Breech-Loading Small Arms, and the Best Form of Projectile	XII. 48	1868
" "	Rifles and Rifling	XVII. 72	1873
ORDE-BROWNE, C., Capt. late R.A.	Firing at Armour Clads reduced to a System	XVI. 69	1872
OUVREY, H. A., Col. C.B.	A Review of the Improvements in Military Tactics and Formation in Germany during the last year (1873), being a précis of an Article from the "Militaire Wochenblatt"	XVIII. 78	1874
OWEN, C. H., Lieut.- Col. R.A.	Modern Artillery, as exhibited at Paris in 1867	XII. 48	1868
P.			
PALLISER, William, Maj. (unattached), late 18th Hussars	The Conversion and Rifling of Cast-Iron Ordnance and on Chilled White Iron Projectiles	XI. 44	1867
" "	The Construction of Heavy Rifled Ord- nance	XII. 50	1868
PARKER-RHODES, C. E.	Parker-Rhodes's Military Boot	XVI. 69	1872
PARKER, F. G. S., Capt. 54th Regt.	Proposed Method of Attack in Skirmish- ing Line	XVII. 74	1873
PARKYNS, Mansfield	Abyssinia	XII. 51	1868
PAYNTER, J. Aylmer, Rear-Admiral	A New Adaptation of Screw Propulsion	XVIII. 79	1874

NAME OF AUTHOR.	SUBJECT OF LECTURE OR PAPER.	Vol. & No. of Journal.	Year.
PELLEW, Pownoll W., Commander R.N.	Fleet Manœuvring	XI. 47	1870
PHILPS, Charles ..	Description of Mont Storm's Breech- Loading 9-pounder Field or Pinnacle Gun	XIV. 5	1867
PICK, Dr. E. ..	A New Method of Improving the Memory and Facilitating the Acquire- ment of Knowledge	XI. 43	1867
POLE, Professor W., F.R.S., M.I.C.E.	The Modes of Determining the Accuracy of Artillery	XI. 43	1867
POORE, F. H., Capt. R.M.A.	Target for Eye-Training	XVII. 72	1873
PRATT, S. C., Lieut. R.A.	The Constitution and Duties of the Artillery of the Advanced Guard of an Army in the Field—(The R. A. Institution Prize Essay of 1874)	XVIII. 79	1874
PRIDEAUX, T. Symes, C.E.	Economy of Fuel in Ships of War ..	XVI. 68	1872
PRITCHARD, H. Baden, Chemical Depart- ment, Roy. Arsenal, Woolwich	The Application of Photography to Military Purposes	XIII. 55	1869
Q.			
QUICK, Geo., Engineer R.N.	Proposed New Combination of Pro- pellers for Ships of War	XX. 86	1876
R.			
RAIKES, G. A., Capt. 3rd W. Y. L. I. Militia	Historical Records of the First Regiment of Militia or 3rd W. Y. L. Infantry— (Notice of Book)	XX. 88	1876
RANKINE, Professor W. J. Macquorn, C.E., LL D., F.R.S. &c.	The Economy of Fuel, Comprising Mineral Oils	XI. 44	1867
RAWSON, H. E., Lieut. R.E.	The German Railway Regiment. . . .	XX. 88	1876
READ, George, R.N.	Helm-Indicator for the Prevention of Collisions at Sea	XII. 48	1868
" "	Apparatus for Light Vessels, Tidal Harbours, &c.	XII. 48	1868

NAME OF AUTHOR.	SUBJECT OF LECTURE OR PAPER.	Vol. & No. of Journal.	Year.
READ, George, R.N.	Read and Nicholl's Patent Day and Night Helin-Signals for Preventing Collisions at Sea	XVI. 69	1872
REDDIE, J., Account- ant-General's De- partment, Admi- rality	Manning the Navy	XI. 45	1867
REDMAN, J. Baldry, M.I.C.E., F.R.G.S.	The Proposed Enclosure of Dover Bay ; Review of Designs, and Historical Essay on the Harbour	XIX. 83	1875
BREED, E. J., C.B., M.P.	Circular Ironclads	XX. 85	1876
RENNIE, G. B., M.I.C.E.	The Comparative Merits of Simple and Compound Engines	XIX. 80	1875
RICHARDS, J. C., Staff Commander R.N.	Fog Signals for Vessels under Weigh ..	XIX. 82	1875
ROBERTSON, A. Cunningham, Col. Commanding 2nd Batt. 8th or King's Regt.	The Appointment and Promotion of Regimental Officers	XII. 49	1868
" "	The Constitution of our Military Forces and the Conditions of Military Service	XIII. 56	1869
ROBERTSON-ROSS, P., Colonel	Report of a Reconnaissance of the North- West Provinces and Indian Territories of the Dominion of Canada, and Narrative of a Journey Across the Continent through Canadian Territory to British Columbia and Vancouver's Island	XVII. 74	1873
ROGERS, J. B. ..	Rogers's Life-Saving Apparatus.. ..	XIV. 57	1870
ROGERS, E., Captain, F.R.G.S.	The Gatling Gun ; its Place in Tactics..	XIX. 82	1875
ROSS, Major W. H., R.A.	Field Artillery on the Connected System	XII. 48	1868
" "	The Cultivation of Scientific Knowledge by Regimental Officers of the British Army	XVI. 69	1872
ROSS OF BLADENS- BERG, John, Cold- stream Guards	Maritime Rights	XX. 87	1876

NAME OF AUTHOR.	SUBJECT OF LECTURE OR PAPER.	Vol. & No. of Journal.	Year.
RUSSELL, John Scott, F.R.S.	Naval Great Guns and Gunnery ..	XIX. 82	1875
RUSSELL, Frank S., Major 14th Hus.	Cavalry	XX. 86	1876
RYDER, A. P., Rear- Admiral	Forms for Registering the Angles of Rolling and Heeling for the Infor- mation of the Construction Depart- ment of the Admiralty	XV. 62	1871
" "	The Naval Hammock, its Buoyancy and Use in Saving Life at Sea in Cases of Collision, &c.	XV. 62	1871
" "	The Higher Education of Naval Officers	XV. 65	1871
" "	Extracts from the four last Chapters of Admiral Jurien de la Gravières Work	XVII. 72	1873
RYDER, A. P., Vice- Admiral	H. M. S. "Victor Emanuel" as an Hospital Ship during the late Ashantee Campaign	XVIII. 78	1874
" "	A Statement to Accompany the Russian Ramming Diagrams Presented by him to the Institution	XVIII. 79	1874
S.			
SCHAW, H., Capt. B.E., Professor of Fortification and Artillery, Staff College, Sandhurst	The Amount of Advantage which the New Arms of Precision give to the Defence over the Attack	XIV. 59	1870
SCHAW, H., Lieut.- Col. R.E., &c. &c.	Field Engineering, Illustrated by some of the Operations of the German Engi- neers during the War of 1870-71	XVIII. 76	1874
SCHNACKENBURG, Captain	Leitfaden für den Unterricht in der Dienstkenntniss auf den Königlichen Kriegsschulen—(Notice of book)	XX. 88	1876
SCHOMBERG, G. E., Major - General, C.B., R.M.A.	Are the Royal Marines a Necessary Auxiliary to the Royal Navy?	XV. 64	1871
SCOTT, Robert H., Director of the Me- teorological Office	Storms in the British Islands, and Tele- graphic Weather Intelligence	XIII. 54	1869

NAME OF AUTHOR.	SUBJECT OF LECTURE OR PAPER.	Vol. & No. of Journal.	Year.
SCOTT, R. A. E., Capt. R.N.	The Maritime Defence of England, including Offensive and Defensive Warfare:—Part I. The Organization of our Maritime Forces. Part II. Our Ships of War, their Armament, &c.	XX. 87	1876
SECCOMBE, E. (Admiralty)	The Preservation of Biscuit and other Farinaceous Articles of Diet in H.M. Navy from Weevil, Maggots, and other Insects	XIX. 83	1875
SILWYN, Captain J. H., R.N.	Breech-Loaders, with Reference to Calibre, Supply, and Cost of Ammunition	XI. 43	1867
" "	Further Information on the Employment of Mineral Oils as Fuel for Steam Ships	XII. 48	1868
" "	The True Economies of England's Naval Power	XV. 63	1871
SHARPE, Benjamin, Commander (ret.) R.N.	The Revolving System of Firing Great Guns	XIII. 56	1869
SHORTLAND, P. F., LL.D., Capt. R.N.	Economy of Coal as Viewed by the Commander of a Steam Vessel	XVIII. 76	1874
SHUTE, C. Cameron, Colonel, C.B.	Military Maxims Suggested or Exemplified by the last Autumn Manœuvres of Continental Armies	XIV. 58	1870
" "	A Memorandum on Mitrailleurs. . .	XVI. 66	1872
SIMPSON, C. H., Capt. R.N.	Plan of Sustaining and Lowering Ship's Quarter Boats	XI. 47	1867
" "	A New Mode of Marine Propulsion . .	XI. 47	1867
SKINNER, Major- General, C.B.	A Cylindrical Propeller Working on a Vertical Shaft in the Midship Section of a Ship	XIV. 58	1870
SLOANE, Captain, Sherwood Foresters Militia	Utilization of the Soldiers' Unemployed Time: A Proposed Scheme Independent of Government Supply; also a Plan for Regimental Charities	XII. 48	1868
SMITH, Michael W., Major-Genl. C.B.	Cavalry: How far its Employment is Affected by Recent Improvements in Arms of Precision	XII. 49	1868
SMITH, Henry . .	Life-Saving Bed or Mattress . . .	XIII. 54	1869

NAME OF AUTHOR.	SUBJECT OF LECTURE OR PAPER.	Vol. & No. of Journal.	Year.
SMITH, R. Murdoch, Captain R. E., F.R.G.S., &c.	The Strategy of Russia in Central Asia, from a Persian Point of View	XVII. 71	1873
SOADY, F. J., Lieut.- Colonel R.A.	Observation on the Defence of England	XIV. 61	1870
SÖRENSEN, John ..	Sörensen's Norwegian Self-Acting Cook- ing Apparatus	XII. 49	1868
STONE, C. P., Lieut. 77th Regiment	Elevating Gun Platform	XIII. 53	1869
STONE, F. S., Capt. R.A., Assist. Super- intendent Royal Gun Factories, Woolwich	The Progress of our Heavy Ordnance, and the Principles and Progress of its Construction	XIV. 58	1870
STOTHERD, R. H., Capt. R.E., In- structor in Tele- graphy, School of Military Engineer- ing, Chatham	Military Telegraphy and Signalling ..	XIV. 59	1870
STOTHERD, R. H., Major R.E., In- structor in Tele- graphy, School of Military Engineer- ing, Chatham	On Defensive Submarine Warfare ..	XV. 65	1871
STRANGE, T. B., Capt. R.A.	Practical Artillery	XV. 63	1871
STRANGE, Alex., Lt.- Colonel, F.R.S.	The Necessity for a Permanent Com- mission on State Scientific Questions	XV. 64	1871
" "	A Proposed Method of Mounting Heavy Ordnance at Sea on the Principle of the Bessemer Saloon	XVIII. 75	1873
STUART, Graham, Capt. 4th W. Y. Artil. Volunteers	Stuart's Breech-Loading Cannon ..	XIV. 57	1870
SYMONDS, T. E., Captain R.N.	The Combined End-on and Broadside System	XI. 46	1867
SYNGE, Millington, Major-Gen. R.E.	Suggested Improvements in Sanitary Arrangements of Hospitals, Barracks, Camps, and Shipping, &c.	XVIII. 78	1874

NAME OF AUTHOR.	SUBJECT OF LECTURE OR PAPER.	Vol. & No. of Journal.	Year.
T.			
TRAYNE, L. O., M.D.	Proposed Alterations in the Martini-Henry Rifle	XIX. 83	1875
THESIGER, Hon. Frederic, Col., C.B., A. D. C. to the Queen	Is a Radical Change in the Tactical Formation of our Infantry Really Necessary?	XVII. 73	1873
THOMAS, W. Cave, late Captain 19th Middlesex Rifle Volunteers	The Establishment of County Military Training Schools; a Suggestion for Improving the Recruiting System	XIII. 54	1869
TOYNBEE, H., Capt., F.R.A.S.	The Winds of the North Atlantic ..	XV. 64	1871
TOYNBEE, H., Capt., F.R.A.S. (Marine Superintendent, Meteorological Office, Board of Trade)	The Meteorology, Sea Temperature, and Currents of the 10° square of the Atlantic which lies between the Equator and 10° N., and from 20° to 30° W.	XVII. 72	1873
TOYNBEE, Mrs. ..	Delineation of some Minute Sea Surface Animals (Coloured Drawings), Part I.	XIX. 80	1875
" "	" " " " II.	XIX. 81	1875
" "	" " " " III.	XIX. 82	1875
" "	" " " " IV.	XIX. 83	1875
TRENCH, F. Chenevix, Capt. 20th Hussars, F.R.G.S.	The Central Asian Question	XVII. 71	1873
" "	The late Russian Campaign against Khiva	XVIII. 77	1874
TULLOCH, Alexander B., Captain 69th Regiment	The Protection of London against an Invading Force Landing on the East Coast	XIV. 59	1870
" "	Suggestions for a Shelter Tent	XVII. 70	1873
" "	The Education and Professional Instruction of Officers	XVII. 75	1873
TYLER, E. S., Major R.E.	The New Works for the Defence of Paris	XIX. 80	1875

NAME OF AUTHOR.	SUBJECT OF LECTURE OR PAPER.	Vol. & No. of Journal.	Year.
V.			
VAN MEYDEN, Aloys., Capt. d'Artillerie, Lausanne	Sur la Dispersion Naturelle des Pro- jectiles et la Loi de Erreurs—(Notice of Book)	XX. 88	1876
VAUGHAN, J. L., C.B., Maj.-General	The Retreat of the Ten Thousand; a Military Study for all Time	XVIII. 76	1874
VINCENT, C. E. H., Lieut. 23rd Royal Welsh Fusiliers	The Austrian Confidential Report, and New Method of Promotion	XVI. 66	1872
" "	The Russian Army	XVI. 67	1872
" "	A Brief Sketch of the System of Officer- ing the Prussian Army	XVI. 69	1872
" "	The Austrian Army	XVII. 73	1873
" "	The Armed Strength of Europe ..	XIX. 83	1875
VINCENT, C. E. H., Lieut.-Col. Central London Rifle Ran- gers	The Turkish Forces and the Military Aspects of the Eastern Question	XX. 86	1876
" "	The Military Resources of Holland ..	XX. 87	1876
VON SCHMIDT, Maj.- General	Instructions for the Cavalry Regiments about to take part in the Exercises of the Combined Cavalry Division detailed from Regiments. Translated by Major-General Walker—(Notice of Book)	XX. 86	1876
W.			
WALKER, Arthur, Captain (temp. h.p.), 79th High- landers	The Dress and Equipment of the Army	XI. 45	1867
WALKER, Beau- champ, C.B., Col., Military Attaché, Berlin	The Battle of Königgratz	XII. 51	1868
WALKER, Beauchamp Major-Gen., Mili- tary Attaché, Berlin	The Position and Lines of Defence of the 5th Corps before Versailles during the Winter of 1870-71	XV. 65	1871

NAME OF AUTHOR.	SUBJECT OF LECTURE OR PAPER.	Vol. & No. of Journal.	Year.
WALKER, Beauchamp, Major-Gen., Military Attaché, Berlin	Outpost Duty	XV. 65	1871
WARDE, Sir Edward C., K.C.B., Major- General R.A.	On the Best Practicable Method for En- suring Efficiency in the Army and for Obtaining an Effective and Reliable Reserve, having Regard to the Existing Feeling in the Country on the Subject	XIX. 80	1875
WARRE, the Rev. Ed- mond, M.A. (Eton College)	Ancient Naval Tactics	XX. 88	1876
WARREN, Frederick, Commander R.N.	Cooking for Troops	XII. 49	1868
WAVENEY, Col. Lord, F.R.S., A.D.C. to the Queen	The Italian Army.. .. .	XX. 86	1876
WEBBER, C. E., Capt. R.E.	Military Labour	XIV. 57	1870
WHEATLEY, John, Captain R.N.	A New Form of Ironclad Ship of War	XV. 64	1871
WHITE, Wm., F.S.A.	White's Porte-Knapsack	XVI. 69	1872
WILBRAHAM, Sir Richard, Lieut- General, K.C.B.	A Sketch of the Russo-Turkish Cam- paigns of 1828-29 in Europe and Asia	XX. 88	1876
WILLIAMS, W. J., Colonel R.A.	Infantry Tactics	XVI. 69	1872
WILSON, Edmund, Captain R.N.	Description of a Model of an Armour- Plated Ship designed by him	XII. 51	1868
" "	Working Heavy Guns on the Broadside, with some Observations on the All- Round Fire, combined with the Broadside System of Armament	XIII. 53	1869
WILSON, C. W., Capt. R. E., Director Topographical and Statistical Depart- ment, War Office	English and Foreign Maps and their Use for Military Purposes	XVI. 67	1872
" "	Notes on Maps (Lecture to Officers of Volunteers)	Special No.	1873
WILSON, J. C., Capt. R.N.	Seamen of the Fleet; their Training, and how the Employment of Marines Afloat in Peace Time affects them	XIX. 83	1875

NAME OF AUTHOR.	SUBJECT OF LECTURE OR PAPER.	Vol. & No. of Journal.	Year.
WILSON, J. C., Capt. R.N.	Is our Merchant Service any Longer a Feeder to the Royal Navy ?	xx. 85	1876
WINGFIELD, F., Dep. Assistant Commis- sary General	Military Transport	xiii. 54	1869
WOOD, Evelyn, Col., B.C., C.B., 90th Regiment	The Ashanti Expedition of 1873 ..	xviii. 78	1874
„ „	Mounted Rifemen (Lecture to Officers of Volunteers)	Special No.	1873
WYATT, Surgeon- Major, Coldstream Guards, F.R.C.S., &c.	Personal Experiences and Reminiscences of the Siege of Paris	xvii. 71	1873

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